2010 Annual Report

Bureau of Communicable Disease Control and Prevention

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Acknowledgements

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Communicable Disease Surveillance 2010 Annual Report

Note: This report does **not** include a summary of sexually transmitted diseases, hepatitis (except hepatitis A), HIV, or environmental conditions.

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We would like to acknowledge the contribution of CDC's informative and knowledgeable public health web sites.

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Missouri Profile 2010

Missouri is 69,697 square miles and slightly more than half of the population live in or near the two major cities, St. Louis, Kansas City. Missouri became a state in 1821 and has 114 counties. Jefferson City is the capital. The major flows of traffic within the state are from the east to west along the Missouri valley and southward along the Mississippi.

Missouri is geographically diverse, with tilled plains in the north, Ozark Mountains in the south and the presence of the Mississippi Alluvial Plain in the southeast part of the state.

Missouri's economy is also highly diversified. While wholesale, retail trade, manufacturing, and agriculture play significant roles in the state's economy, service industries provide more income and jobs than any other segment, and include a growing tourism and travel sector. Missouri is a leading producer of transportation equipment (including automobile manufacturing and auto parts), beer and beverages, and defense and aerospace technology. Food processing is the state's fastest-growing industry. Missouri mines produce 90% of the nation's principal (non-recycled) lead supply. Other natural resources include iron ore, zinc, barite, limestone, and timber. The state's top agricultural products include grain, sorghum, hay, corn, soybeans, and rice. Missouri also ranks high among the states in cattle and calves, hogs, and turkeys and broilers. A vibrant wine industry also contributes to the economy.

Population (2009)*	**5,987,580**	**Percent of Total Population**
Urban	69.4%	(Based on 2000 census)
Rural	30.6%	(Based on 2000 census)

Live Births	78,849
Deaths	54,064

Sex	**Population**	
Male	2,926,002	48.9%
Female	3,061,578	51.1%

Race	**Population**	**Percent of Total Population**
White	5,133,124	85.7%
Black	713,001	11.9%
Other	141,455	2.4%

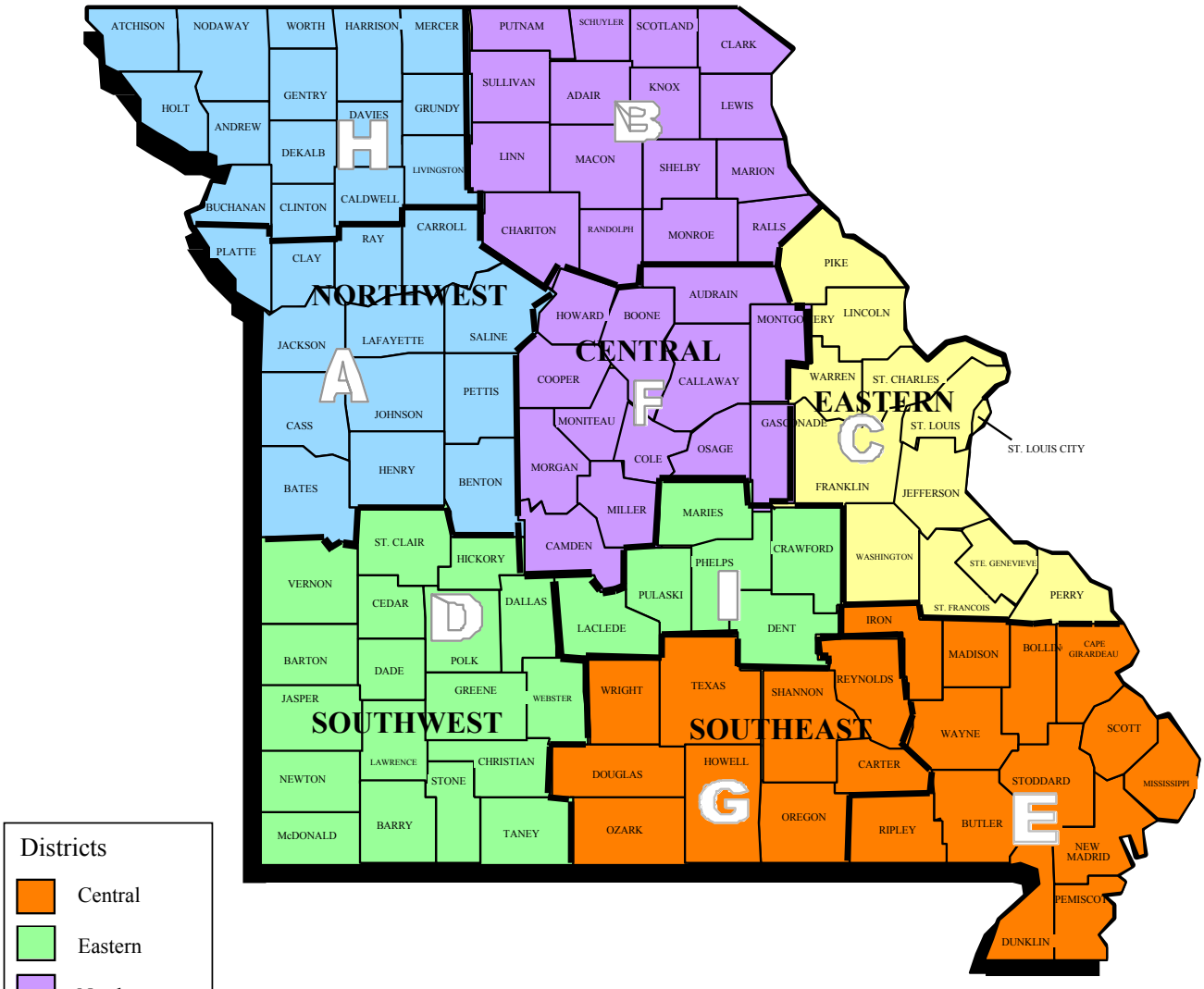
Age Group	**Population**	
<1	78,849	1.3%
1-4	324,680	5.4%
5-14	779,013	13.0%
15-24	841,250	14.0%
25-39	1,164,849	19.5%
40-64	1,976,514	33.0%
65+	822,425	13.7%

District	**Population**	
Central	650,366	10.9%
Eastern	2,252,546	37.6%
Northwest	1,599,642	26.7%
Southeast	460,281	7.7%
Southwest	1,024,745	17.1%

Leading Causes of Death:**	**Number of Deaths Reported**	**Percent of Total Deaths Reported**
Heart disease	13,845	25.6%
Malignant Neoplasms	12,435	23.0%
Chronic lower respiratory disease	3,436	6.4%
Cerebrovascular disease (stroke)	3,013	5.6%
Unintentional injuries	2,868	5.3%
Alzeheimer's disease	1,719	3.2%
Pneumonia and Influenza	1,346	2.5%
Diabetes Mellitus	1,326	2.5%

*Unless otherwised noted, all percentages are based on 2009 population estimates.
**Not all causes of death are listed.
Data Provided by: Public Health Practice & Administrative Support Section, Bureau of Health Informatics, Department of Health and Senior Services.

Districts for Statewide Disease Investigation / Terrorism Response / TB Control



Source: Missouri Department of Health and Senior Services
August 2011

Introduction

The Bureau of Communicable Disease Control and Prevention (BCDCP) provides prevention, intervention, and surveillance programs for ninety-one reportable communicable (or infectious) diseases and conditions of public health significance in Missouri. Many of these diseases are emerging infections (such as Multi-drug resistant tuberculosis and Novel Influenza). The program also maintains a statewide disease registry and surveillance system (WebSurv) and performs analysis of morbidity to identify trends and risk factors for public health messaging. In addition to WebSurv, the Electronic Surveillance System for Early notification of Community-Based Epidemics (ESSENCE) is a statewide syndromic surveillance system that examines chief complaint data from hospitals, emergency rooms, over the counter drug sales, and information from the poison control centers. The BCDCP works closing with our 115 local public health agency (LPHA) partners to protect Missouri's citizens and visitors from the threats of infectious diseases of public health significance.

BCDCP services include:

- Conduct epidemiological studies to investigate the origin, cause, and method of transmission of communicable diseases in order to identify and implement appropriate disease control and preventive measures.
- Identify communicable disease surveillance data needs, design data collection processes/systems, develop and maintain data systems and datasets, analyze and interpret data at regular intervals to track trends and provide regular reports on these analyses to support targeted interventions.
- Consult with LPHA's, government at all levels, community organizations, hospitals, health care providers, private businesses, media, and others regarding diagnosis, and control measures for reportable communicable diseases and provide public health education as requested.
- Provide training and technical assistance/consultation to local health officials on disease investigations, control activities, and analysis/interpretation of data to prevent communicable diseases in their communities and rapidly respond to outbreaks.
- Provide community planning and epidemiologic response to emergencies such as bioterrorism, communicable disease outbreaks and natural disasters such as flooding, earthquakes and catastrophic weather events.
- Provide medications for the treatment of tuberculosis (TB) disease or Latent TB infection, as well as tuberculin skin testing for use in extended contact investigations and assisting LPHA's with TB case management.
- Provide assistance to local health officials in the screening and treatment of public health conditions in newly arriving refugees.
- Collaborate with other programs within the Missouri Department of Health and Senior Services (DHSS), other state and federal agencies, and community-based organizations in emergency event planning and response.

The DHSS rule for the **Reporting of Communicable, Environmental and Occupational Diseases**, can be found at: 19 CSR 20-20.020. This report contains information only for those diseases and conditions that are addressed by the BCDCP. Information and statistics for HIV, STD, and Hepatitis can be found by clicking on Bureau of HIV, STD, and Hepatitis.

Introduction

Data used in this report were gathered from disease and condition reports made by medical providers, laboratories, hospitals, LPHA's, and others.

The information collected through 19 CSR 20-20.020 flows from the local public health jurisdictions to DHSS and on to the national Centers for Disease Control and Prevention (CDC). Data are linked to the national level through the CDC's National Electronic Telecommunications Surveillance System (NETSS). This information is critical for two reasons:

1. It enables public health agencies to act quickly to prevent the spread of disease, and
2. It provides an overall view of disease trends at the local, state and national levels. Analysis of these trends permits targeting of scarce resources where they are most needed and allows the assessment of our effectiveness in preventing and controlling disease.

There are limitations to the data provided in this report for the following reasons:

- sick people do not always seek healthcare; and,
- healthcare providers and others do not always recognize, confirm, or report notifiable conditions.

Therefore, reported cases may represent only a fraction of the actual burden of disease.

BCDCP is pleased to provide the following summary of data relating to over 34,985 cases that were reporting during calendar year 2010. In addition to the contributors listed on the previous page, BCDCP would like to recognize the staff of our State Public Health Laboratories and the thousands of people in LPHA's, clinics, hospitals and clinical laboratories throughout Missouri whose disease reports and efforts constitute the basis for this document. Without vigilant reporting of disease, targeted and effective prevention and control measures cannot be implemented.

While this report was compiled by DHSS, please keep in mind that most of the public health workforce is in city or county health departments. Therefore, much of the work is at that level. The state, county, and city health departments and their private-sector partners work to promote health, protect against illness and injury, and render public health services to all people in Missouri.

A table of all reported notifiable diseases is located here. Where spatial analysis and use of Geographic Information Systems (GIS) was useful, maps have been provided to depict the data. Hyperlinks to additional information are included throughout the document.

We hope that you find this report informative and useful. We invite your questions and comments on this report, "Communicable Disease Surveillance 2010 Annual Report".

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Executive Summary

Every year in Missouri, communicable disease investigation and control efforts demand a substantial amount of public health resources, and 2010 was no different. A total of 34,985* conditions were reported, investigated, and entered into Missouri's communicable disease registry system, WebSurv. The information from WebSurv is used to monitor trends at state, district, and local levels. Data are also transmitted to the CDC, which allows Missouri to contribute national communicable disease trends and inform national disease surveillance programs.

The Missouri State Public Health Laboratory (SPHL) is an important player in communicable disease investigation and control efforts. The SPHL provides technical assistance through consultations and specialized testing services. In 2010, the SPHL performed 3,064,400 analyses in support of many diverse public health programs and also conducted specialized procedures as a reference laboratory. SPHL analyzes samples from Missouri and non-Missouri residents. Their contribution to Pulse Net, an electronic system that tracks DNA fingerprints of specific organisms that cause food borne disease, allows us to more readily identify potential outbreaks.

The following document represents a summary of the diseases of public health significance in our communities; our hope is that the information can be used to prevent additional cases. The conditions selected for this year's spotlight include three gastrointestinal illnesses (Campylobacteriosis, Cryptosporidiosis, *Escherichia coli* infection), two respiratory bacterial illnesses (*Haemophilus influenzae* and *Streptococcus pneumonia*), one rare respiratory disease caused by a fungus (Coccidioidomycosis), as well as Rabies, Animal and Human, and Rabies post-exposure Prophylaxis (PEP) Initiated.

The rate of campylobacteriosis reported in 2010 was the highest reported since data on *Campylobacter* infection have been collected and constituted a 46% increase compared to previous years. Three *Campylobacter* outbreaks were reported in 2010.

Although only fifteen cases of Coccidioidomycosis were reported in 2010, this represented a 400% increase above the five-year median. It is unclear what lead to this increase; however, travel to areas where *Coccidiodes* is more commonly present in the environment may be a potential reason.

A large increase in cryptosporidiosis incidence was reported in 2010, a rate which surpassed historical levels; the rate observed was over 150% increase compared to previous years' data. Over half of the cases were attributed to a single outbreak caused by contaminated recreational waters.

Escherichia coli is a diverse group of bacteria, some strains of which cause human disease. The most life-threatening complication of *E. coli* infection is hemolytic uremic syndrome (HUS). Although rare, HUS is very serious and can require dialysis and lead to the death of up to 5% of those who develop the condition. One type of *E. coli* that is of public health importance is shiga toxin-producing *E. coli* (STEC); STEC caused 236 reported illnesses in Missouri in 2010. This represented a 55% increase in the rate observed in previous years. This may be partially attributable to two outbreaks of a common STEC strain in 2010, however, cases identified in these outbreaks only accounted for about 20% of all STEC cases reported.

Executive Summary

*Haemophilus influenzae (H. influenzae)*includes a group of bacteria that can cause invasive disease. One type, *H. influenza* type b (Hib) can cause several types of serious infections including meningitis, pneumonia, bacteremia, epiglottitis, and cellulitis, most typically in children less than five years of age. Fortunately, a Hib vaccine exists, which has lead to a dramatic (99%) decrease in invasive disease. In 2010, 87 *H. influenza* infections were reported, which was a 107% increase compared to previous years' data. The cause of this increase is unknown, but the highest rates were observed among children less than one year old and persons 65 years and older. Only four *H. influenzae* cases were Hib in 2010. Because of the seriousness of Hib in particular, consistent tracking of *H. influenzae* and promotion of Hib vaccine for children is essential.

Rabies is a fatal viral illness that affects mammals, including humans. During 2010, 63 cases of animal rabies were detected in Missouri, which was a slight decrease from the 65 cases detected in 2009. In 2010, 2,590 animals were tested for rabies and 2.4% tested positive. Among wild animals, bats and skunks tested positive most frequently. It is interesting to note that 3.6% of bats tested were positive for rabies compared to nearly half of all skunks tested (47.8%). The only domestic animal to test positive in 2010 was a cat. Trends in animal rabies infection are one piece of information used to determine if humans should receive post-exposure prophylaxis (PEP) for rabies. Initiation of rabies PEP is reportable in Missouri; 294 reports were received by DHSS in 2010. No human deaths due to rabies were reported in 2010.

S. pneumoniae invasive disease is reportable for children under five years of age; in 2010, 40 cases were reported in Missouri, which is a 37.9% increase from previous years' data. No outbreaks were reported among children under five, so the cause of this increase is not completely understood. Invasive disease due to *S. pneumoniae* is reportable in Missouri if the organism is resistant to approved antibiotics; 91 such cases were reported in 2010. This was a slight increase from previous years' data; however, no outbreaks due to *S. pneumoniae* were reported in 2010. Continued drug resistance tracking and promotion of the appropriate use of antibiotics is essential because *S. pneumoniae* is present in the majority of the population, is easily spread, and can cause serious and fatal disease among some individuals.

This is a sample of the interesting information contained within the 2010 Annual Report. It should be noted that our partners at Missouri's local public health agencies contributed significantly to communicable disease surveillance, control, and prevention efforts in 2010. All of their efforts helped to protect Missourians and contributed substantially to the creation of this report.

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* The figure "34,985" refers to all reportable communicable diseases that are monitored by the Bureau of Communicable Disease Control and Prevention. This does not include sexually transmitted diseases, HIV/AIDS, Hepatitis B (acute and chronic), Hepatitis C (acute and chronic) and conditions that are not infectious. Separate reports are available from DHSS for these diseases/conditions.

Section A - Communicable Disease Surveillance

Disease Outbreaks

The BCDCP maintains a database and provides on-site and technical assistance to the LPHA's on reported outbreaks. We also contribute to several national reporting systems such as the National Outbreak Reporting System (NORS), CDC's OutbreakNet Team, and PulseNet, national network of public health and food regulatory agency laboratories coordinated by CDC. These systems, along with the Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE) software, are used to rapidly identify potential outbreaks in order to implement effective measures to prevent illness and reduce the public health threat. The BCDCP reviews outbreaks for lessons learned and any new information on disease reservoirs, modes of transmission, control strategies and provide data to CDC for national analysis.

Diseases and Conditions	Number of Outbreaks	Diseases and Conditions	Number of Outbreaks
Gastrointestinal		**Respiratory**	
Acute Gastrointestinal Illness - etiology unknown	24	Acute Respiratory Illness	4
Campylobacter	3	2009 H1N1	1
Clostridium perfringes	1	Legionellosis	1
Cryptosporidiosis	1	Parapertussis	1
E. coli O157:H7	2	**Total**	**7**
Norovirus	22		
Salmonellosis	10	**Vaccine Preventable**	
Shigellosis (*S. sonnei*)	6	Chickenpox	10
Total	**69**	Measles	1
		Pertussis	9
Other		**Total**	**20**
Methicillin-resistant *Staphylococcus aureus*	1		
Scabies	6		
Total	**7**		
Total Outbreaks	**103**		

Diseases of Note

There are several notable decreasing and increasing disease trends as reflected in the 15 year report.

Decreasing Trends:

- Pertussis, with 604 cases reported in 2010, decreased 40.5% from the 1,015 cases reported in 2009.
- Legionellosis, with 37 cases reported in 2010, decreased 43.1% from the 2009 total of 65 cases reported. This is the third consecutive year there has been a decrease in the number of reported cases of legionellosis.

Increasing Trends and/or Significant Increases:

- Campylobacter, with 1,054 cases reported in 2010, increased 36.9% from the 770 cases reported in 2009. There were three reported outbreaks of campylobacter reported in 2009. For additional information, click here.
- Cryptosporidiosis, with 548 cases reported in 2010, increased 183.9% from the 193 cases reported in 2009. There was one reported outbreak of cryptosporidiosis in 2010. For additional information, click here.

Section A - Communicable Disease Surveillance

Comparative Statistics, Reported Diseases, Missouri 2010

Reportable Diseases & Conditions entered into the Missouri Health Surveillance Inforamtion System (WebSurv)	Case Count 2010	5-Year First Quartile	5-Year Median	5-Year Third Quartile	% Change from 5-Year Median	Rate per 100,000
Adult Respiratory Distress Syndrome (ARDS)	4	0	1	3	300.00%	0.1
Animal Bites	6,917	4,952	5,348	6,288	29.30%	115.5
Brucellosis	3	1	1	1	200.00%	0.1
Campylobacteriosis	1,054	714	722	770	46.00%	17.6
Chlamydia	26,049	22,982	23,308	24,817	-100.00%	0
Coccidioidomycosis	15	3	3	9	400.00%	0.3
Creutzfeldt-Jakob Disease (CJD)	8	3	5	6	60.00%	0.1
Cryptosporidiosis	548	195	214	246	156.10%	9.2
Dengue Fever	6	3	3	5	100.00%	0.1
E Coli Shiga Toxin Positive	131	72	75	77	74.70%	2.2
E. Coli (All)	236	143	152	153	55.30%	3.9
E. Coli (All) + HUS	254	150	161	166	57.80%	4.2
E. Coli O157 H7	105	75	76	80	38.20%	1.8
Ehrlichiosis (All)	142	99	167	222	-15.00%	2.4
Giardiasis	426	515	522	524	-18.40%	7.1
Gonorrhea	7,159	8,014	9,455	9,876	-100.00%	0
HIV Disease	585	520	536	575	-100.00%	0
Haemophilus Influenzae, Invasive	87	39	42	63	107.10%	1.5
Hemolytic Uremic Syndrome	18	7	8	9	125.00%	0.3
Hepatitis A Acute	30	27	32	45	-6.30%	0.5
Hepatitis B (Pregnancy) Prenatal	136	125	133	136	2.30%	2.3
Hepatitis B Acute	67	40	47	62	42.60%	1.1
Hepatitis B Chronic Infection	248	239	328	341	-24.40%	4.1
Hepatitis C Acute	6	2	5	18	20.00%	0.1
Hepatitis C, Chronic Infection	4,409	4,463	4,831	4,842	-8.70%	73.6
Influenza***	17,739	12,991	14,845	30,567	-100.00%	0
Legionellosis	37	31	50	65	-26.00%	0.6
Leptospirosis	1	0	0	1	N/A	0
Listeriosis	12	6	11	12	9.10%	0.2
Lyme	5	10	10	13	-50.00%	0.1
Malaria	21	8	14	14	50.00%	0.4
Measles	3	0	1	2	200.00%	0.1
Meningococcal Disease	23	18	26	27	-11.50%	0.4
Mumps	10	8	12	15	-16.70%	0.2
Neuroinvasive St Louis	1	0	0	0	N/A	0
Pertussis	604	308	561	656	7.70%	10.1
Q Fever (All)	3	5	11	12	-72.70%	0.1
Rabies Animal	63	64	65	66	-3.10%	N/A
Rabies Post Exposure Prophylasis	294	86	196	246	50.40%	4.9
Rocky Mountain Spotted Fever	278	163	253	315	9.90%	4.6
Salmonellosis	843	764	764	766	10.30%	14.1
Shiga Toxin + (Non E. Coli - Unknown Organism)	1	5	9	9	-88.90%	0
Shigellosis	1,582	658	1,017	1,046	55.60%	26.4
Strep Disease, Group A Invasive	142	91	91	94	56.00%	2.4
Strep Pneumoniae, Drug-Resistant	94	44	65	74	44.60%	1.6
Strep Pneumoniae, lt 5 Years, Invasive	37	16	29	41	27.60%	0.6
Syphilis, Primary and Secondary	152	168	173	224	-100.00%	0
Tetanus	2	2	2	2	0.00%	0
Toxic Shock (Staph) Syndrome	2	2	3	4	-33.30%	0
Toxic Shock (Strep) Syndrome	4	1	2	2	100.00%	0.1
Trichinosis	1	0	0	0	N/A	0
Tuberculosis	107	104	107	108	0.00%	1.8
Tuberculosis Infection	2,565	3,393	3,573	3,837	-100.00%	0
Tularemia	18	14	21	27	-14.30%	0.3
Typhoid Fever	2	2	2	3	0.00%	0
Varicella (Chickenpox)	488	674	859	1,188	-43.20%	8.2
Varicella (Chickenpox) Death Resulted	1	0	0	1	N/A	0
Vibriosis	5	0	0	0	N/A	0.1
West Nile Fever and Viral Encephalitis-Meningitis	3	15	30	63	-90.00%	0.1
Yersiniosis	10	6	9	10	11.10%	0.2

***Influenza is reported based on the Influenza Season Year. 2010 includes Weeks 40 to 52 of 2010 and Weeks 1 to 20 of 2011.
Data Source: WebSurv

Section A - Communicable Disease Surveillance

Campylobacteriosis

Click to view

Campylobacteriosis is an infectious disease primarily caused by the bacteria *Campylobacter jejuni* and, less commonly, *Campylobacter coli*. These bacteria are often present in the gastrointestinal tract of both domestic and wild animals including chickens, cows, dogs, cats, rodents, and many others. Campylobacteriosis is usually associated with the handling or consumption of raw or undercooked meats, contaminated food or water, or contaminated raw milk. Persons may also become infected following contact with infected animals including pets (puppies and kittens) and farm animals. The spread of *Campylobacter* from one person to another is uncommon, though it may occur, particularly if the infected person is a small child. The ingestion of a very small number of the bacteria can result in persons becoming ill.

Table 1. Campylobacteriosis, Comparative Statistics, by Socio-demographic Category, Missouri[1] 2010

		Case Count 2010	% of Total	Rate per 100,000	5-Year Median	% Change from 5-Year Median
State of Missouri		1,054	100%	17.6	722	46%
Sex	Female	514	48.80%	16.8	330	55.80%
	Male	540	51.20%	18.5	381	41.70%
Race	Black	38	3.60%	5.3	23	65.20%
	Other	18	1.70%	12.7	4	350.00%
	Unknown	176	16.70%	N/A	263	-33.10%
	White	822	78.00%	16	458	79.50%
Age Group	00 to <01	48	4.60%	60.9	31	54.80%
	01 to 04	132	12.50%	40.7	98	34.70%
	05 to 14	103	9.80%	13.2	67	53.70%
	15 to 24	111	10.50%	13.2	87	27.60%
	25 to 39	190	18.00%	16.3	131	45.00%
	40 to 64	305	28.90%	15.4	237	28.70%
	65 plus	161	15.30%	19.6	87	85.10%
	Unknown	4	0.40%	N/A	3	33.30%
District	Central	85	8.10%	13.1	74	14.90%
	Eastern	284	26.90%	12.6	264	7.60%
	Northwest	294	27.90%	18.4	139	111.50%
	Southeast	96	9.10%	20.9	82	17.10%
	Southwest	295	28.00%	28.8	161	83.20%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2009 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System (WebSurv)

Campylobacteriosis is an acute diarrheal disease of variable severity. Many infected persons and animals do not exhibit symptoms. Symptomatic cases are characterized by diarrhea (frequently bloody), abdominal pain, malaise, fever, and nausea and/or vomiting. In neonates, bloody diarrhea may be the only symptom. Symptoms usually begin 2-5 days after infection. Mild infections last 1-2 days, and most cases resolve in approximately one week. However, some adults may experience prolonged illness and/or relapses. In very rare instances, post-infection complications include reactive arthritis, febrile convulsions, or Guillain-Barre syndrome (an acute febrile polyneuritis). Campylobacteriosis may mimic acute appendicitis or inflammatory bowel disease.

Statewide in 2010, there were 1,054 reported cases of confirmed or probable campylobacteriosis for a rate of 17.6 per 100,000 population. This is the highest number of cases reported since data has been collected. In comparison to the 5-year median , the rate of reported campylobacteriosis increased by 46.0%. All districts reported increases with notable increases in the Northwest District, 111.5% over the 5-year median and the Southwest District which saw an 83.2% increase over the 5-year median. Males reported 51.2% of

Section A - Communicable Disease Surveillance

Campylobacteriosis - Continued

the cases. Individuals 40 to 64 years of age accounted for 28.9% of all reported cases. Missouri reported three *Campylobacter* outbreaks during 2010. Along with the outbreaks, an increased awareness of Campylobacteriosis occurring could be a reason for the increase in reported cases throughout the state.

Laboratory testing for campylobacteriosis had the following breakdown: cultured confirmed 73.7% of the cases; and enzyme immunosassay (EIA) 14.5% of the cases. Epidemiological linked cases were reported for 11.6% of the cases.

Of the 1,054 cases only 19% reported the species, with *C. jejuni* the most common with 17%. For the previous three years, the species had been identified on an average of 27% of all cases. This decline may be due to the use of EIA testing, which does not identify the species.

Some simple food handling practices can help prevent *Campylobacter* infections.

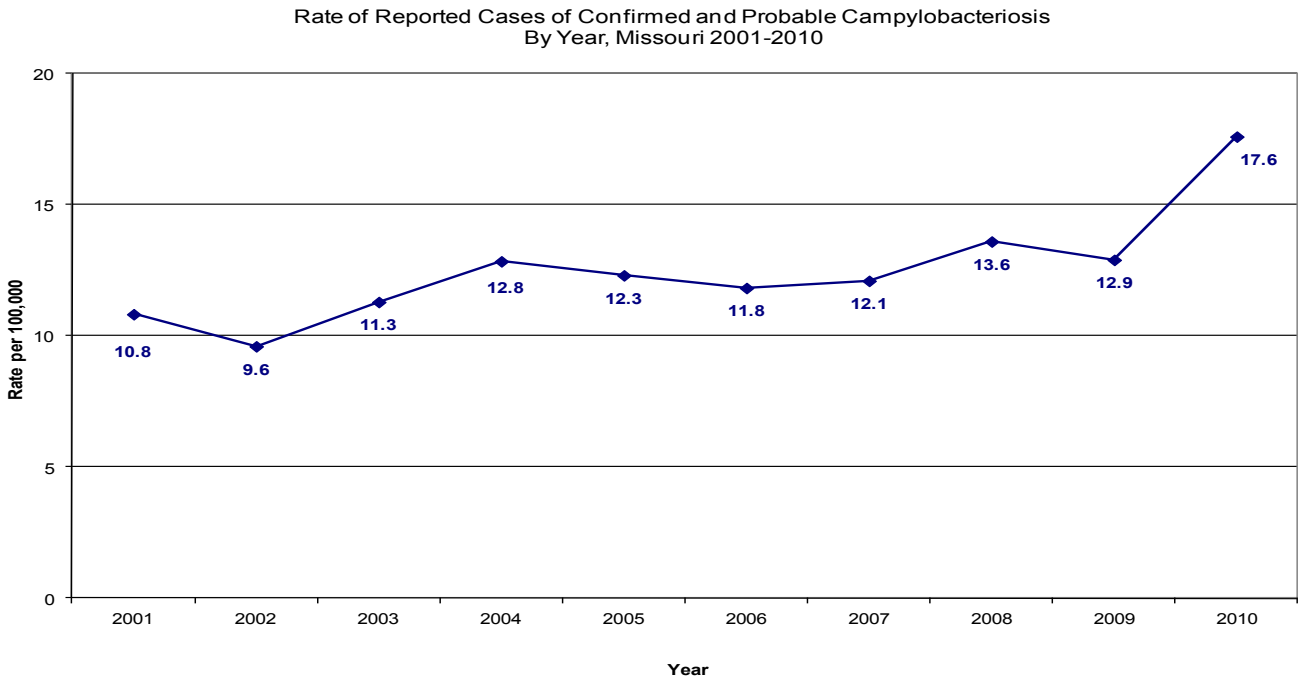
- Cook all poultry products thoroughly. Make sure that the meat is cooked throughout (no longer pink) and any juices run clear. All poultry should be cooked to reach a minimum internal temperature of 165°F.
- If you are served undercooked poultry in a restaurant, send it back for further cooking.
- Wash hands with soap before preparing food
- Wash hands with soap after handling raw foods of animal origin and before touching anything else.
- Prevent cross-contamination in the kitchen by using separate cutting boards for foods of animal origin and other foods and by carefully cleaning all cutting boards, countertops, and utensils with soap and hot water after preparing raw food of animal origin.
- Avoid consuming unpasteurized milk and untreated surface water.
- Make sure that persons with diarrhea, especially children, wash their hands carefully and frequently with soap to reduce the risk of spreading the infection.
- Wash hands with soap after contact with pet feces.

Physicians who diagnose campylobacteriosis and clinical laboratories that identify this organism should report their findings to the local health department. If multiple cases occur at the same time, it may mean that many people were exposed to a common contaminated food item or water source which might still be available to infect more people. When outbreaks occur, community education efforts can be directed toward proper food handling techniques, and toward avoiding consumption of raw (not pasteurized) milk.

Comparison to National Data: Campylobacteriosis is not a nationally notifiable disease; however national sentinel surveillance data provides the following analysis. Missouri's campylobacteriosis attack rates per 100,000 has shown increases from 9.6 in 2002 to 17.6 for 2010. In comparison to Foodborne Diseases Active Surveillance Network (FoodNet) sites, their rates range from 6.07 to 32.94, with an average of 15.7. For the FoodNet sites (10 total), only three sites have a higher attack rate than Missouri.

Section A - Communicable Disease Surveillance

Campylobacteriosis - Continued



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Section A - Communicable Disease Surveillance

Coccidioidomycosis

Coccidioidomycosis, also known as "valley Fever", is a fungal disease of varying severity, caused by inhaling soil-based *Coccidiodes* spores. From the time of its initial identification in 1892 up until the mid-20th century, coccidioidomycosis was thought to be a rare and highly lethal disease. By the 1950's, researchers had a more complete understanding of the incidence and clinical spectrum of "valley fever". Prevalence studies conducted at that time on populations of school-aged children and military personnel in California revealed that coccidioidomycosis was fairly common in the Central Valley, with 15% and 25-50% of the two groups showing serological evidence of past infection, respectively. *Coccidiodes* species are endemic in arid and semi-arid areas in the Western Hemisphere, including parts of the Southwestern U.S., Central America and South America. Seasonal variation in incidence has been noted, with increases in reports during drier periods. Cases involving accidental laboratory exposures have also been reported. Person-to-person transmission does not occur.

Table 1. Coccidioidomycosis, Comparative Statistics, by Socio-demographic Category, Missouri[1] 2010

		Case Count 2010	% of Total	Rate per 100,000	5-Year Median	% Change From 5-Year Median
State Of Missouri		15	100.00%	0.3	3	400.00%
Sex	Female	8	53.30%	0.3	1	700.00%
	Male	7	46.70%	0.2	2	250.00%
Race	Black	2	13.30%	0.3	0	N/A
	Unknown	5	33.30%	N/A	1	400.00%
	White	8	53.30%	0.2	3	166.70%
Age Group	00 to <01	1	6.70%	1.3	0	N/A
	01 to 04	0	0.00%	0	0	0.00%
	05 to 14	0	0.00%	0	0	0.00%
	15 to 24	0	0.00%	0	1	-100.00%
	25 to 39	4	26.70%	0.3	0	N/A
	40 to 64	5	33.30%	0.3	3	66.70%
	65 plus	5	33.30%	0.6	1	400.00%
District	Central	2	13.30%	0.3	1	100.00%
	Eastern	7	46.70%	0.3	2	250.00%
	Northwest	2	13.30%	0.1	0	N/A
	Southeast	0	0.00%	0	0	0.00%
	Southwest	4	26.70%	0.4	0	N/A

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2009 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System (WebSurv)

Signs of primary infection typically appear within one to four weeks of exposure as an influenza-like illness, which can progress to pneumonia. Weight loss and arthralgias are common with acute infection and, less frequently, skin manifestations ranging from a transient, non-pruritic rash to erythema nodosum or erhythema multiforme have been reported. Most cases are self-limiting, and inapparent infection is common.

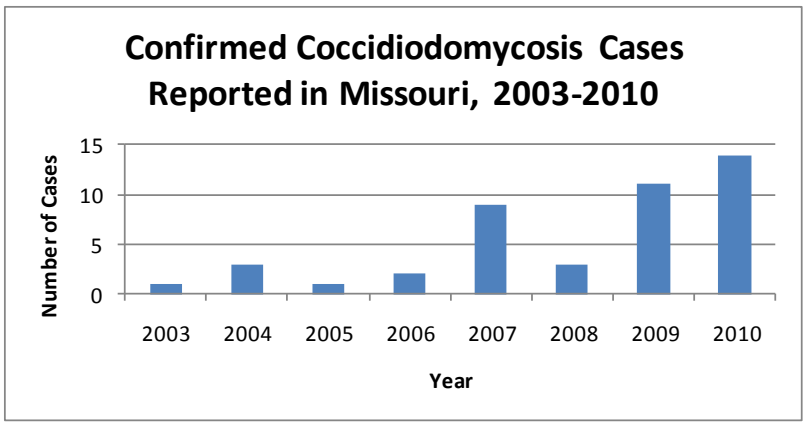
Infection may be asymptomatic or may produce an acute or chronic disease. Although the disease may initially resemble an influenza-like or pneumonia-like febrile illness primarily involving the bronchopulmonary system, dissemination can occur to multiple organ systems. An illness is typically characterized by one or more of the following: influenza-like signs and symptoms (e.g., fever, chest pains, cough, myalgia, arthralgia, and headache), pneumonia or other pulmonary lesion, diagnosed by chest radiograph, erythema nodosum or erythema multiforme rash, involvement of bones, joints, or skin by dissemination, meningitis, or involvement of viscera and lymph nodes.

Section A - Communicable Disease Surveillance

Coccidioidomycosis - continued

Meningitis is the most serious form of disseminated coccidioidomycosis. Immunocompromised persons and pregnant women are at higher risk for disseminated infection.

Symptoms of early coccidioidomycosis are similar to other respiratory infections, and health care providers outside of endemic areas may not consider coccidioidomycoses in patients with compatible symptoms. Thus, a definitive diagnosis usually requires specific laboratory testing: identification of *Coccidioides* species or detection of anticoccidioidal antibodies in human clinical specimens.



Statewide in 2010, a total of 15 cases of cocciodioidomycoses were reported in Missouri. This is a 36% increase from 2009 when 11 cases were reported. It is a 400% increase from the five-year median of three cases. The 2010 cases were evenly distributed between females (eight) and males (seven). One case was in the less than one year age group, four were in the 25-49 year age group, five in the 40-64 year age group, and five in the greater than 65 year age group. The Eastern District had 46.7% of the cases, and for cases whose race was known, the rate of disease was 0.3 per 100,000 for blacks and 0.2 per 100,000 for whites.

Missouri's increase in case counts over the past few years may be a reflection of increased travel to (or former residence in) an endemic area, increased awareness about the condition among health care providers or other unidentified risk factor(s).

Since 1994, the Council for State and Territorial Epidemiologists (CSTE) maintains support for the inclusion of coccidioidomycosis on the list of nationally notifiable conditions. Currently, the condition is explicitly notifiable in 17 states. Collecting and analyzing national coccidioidomycosis incidence data is an important public health effort for the following reasons:

- More people live in and travel to endemic areas, such as the Southwestern Unites States, increasing the population-at-risk.
- The population of immunocompromised persons, who are higher risk for more severe disease and sequelae, has increased.
- More diagnostic and treatment opportunities are available.
- National surveillance data is essential to support continued efforts in the development of a vaccine.
- Coccidioides species have been identified as a potential bioterrorism agent.

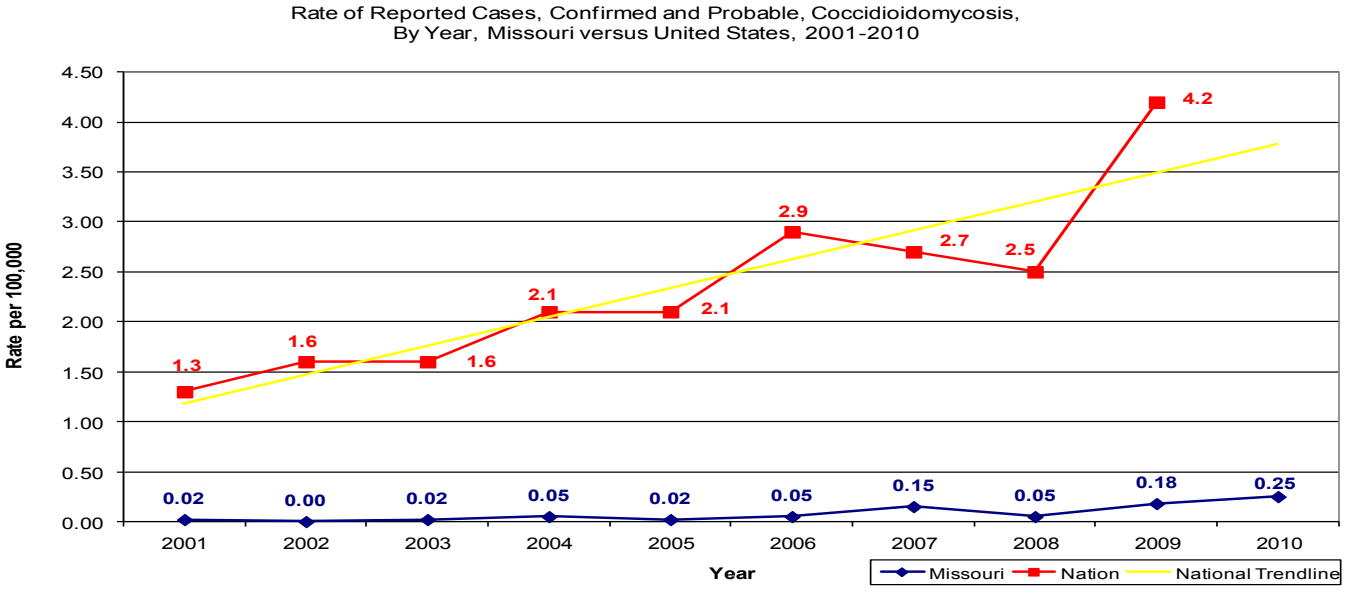
Section A - Communicable Disease Surveillance

Coccidioidomycosis - continued

Comparison to National Data: Missouri's rate per 100,000 over the past ten years is well below the national rate. Nationally in 2010 there were over 16,000 reported cases of coccidioidomycosis, the majority of which were located in Arizona and California. Since Coccidioidomycosis became reportable in Missouri in 2003, the rate has increased from 0.02 in 2003 to 0.25 in 2010.

References:

1. Heymann, D (Ed). *Coccidiodomycosis* in: Control of Communicable Diseases Manual (CCDM), American Public Health Association,19th ed., 2008. (139-141).
2. Galgiani, JN. Anne A. *Coccidiodes Species*, in: Gerald L. Mandell, John E. Bennett, & Raphael Dolin, Eds. Principles and Practice of Infectious Diseases, 7th ed., Pennsylvania:Churchill Livingstone Elsevier, 2010: (3333-3345).
3. CSTE position statement 10-ID-04: Public Health Reporting and National Notification for Coccidioidomycosis . Available at: http://www.cste.org/dnn/ (accessed June 2011).



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Section A - Communicable Disease Surveillance

Cryptosporidiosis

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Cryptosporidium is a microscopic parasite that causes the diarrheal disease cryptosporidiosis. Both the parasite and the disease are commonly known as "Crypto." There are many species of C*ryptosporidium* that infect humans and animals, the most common species in humans are *Cryptosporidium hominis*.

Table 1. Cryptosporidiosis, Comparative Statistics, by Socio-demographic Category, Missouri[1] 2010

		Case Count 2010	% of Total	Rate per 100,000	5-Year Median	% Change From 5-Year Median
State of Missouri		548	100.00%	9.2	214	156.10%
Sex	Female	298	54.40%	9.7	110	170.90%
	Male	250	45.60%	8.5	104	140.40%
Race	Black	65	11.90%	9.1	8	712.50%
	Other	5	0.90%	3.5	1	400.00%
	Unknown	84	15.30%	N/A	55	52.70%
	White	394	71.90%	7.7	141	179.40%
Age Group	00 to <01	14	2.60%	17.8	4	250.00%
	01 to 04	128	23.40%	39.4	43	197.70%
	05 to 14	118	21.50%	15.1	45	162.20%
	15 to 24	57	10.40%	6.8	22	159.10%
	25 to 39	121	22.10%	10.4	37	227.00%
	40 to 64	79	14.40%	4	38	107.90%
	65 plus	31	5.70%	3.8	15	106.70%
District	Central	71	13.00%	10.9	8	787.50%
	Eastern	296	54.00%	13.1	47	529.80%
	Northwest	83	15.10%	5.2	53	56.60%
	Southeast	13	2.40%	2.8	15	-13.30%
	Southwest	85	15.50%	8.3	77	10.40%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2009 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System (WebSurv)

While this parasite can be spread in several different ways, water (drinking water and recreational water) is the most common method of transmission. *Cryptosporidium* is one of the most frequent causes of waterborne disease among humans in the United States. The parasite is protected by an outer shell that allows it to survive outside the body for long periods of time and makes it very tolerant to chlorine disinfection.

Symptoms of crypto generally begin 2 to 10 days (average 7 days) after becoming infected with the parasite. The most common symptom of crypto is watery diarrhea. Other symptoms may include: stomach cramps or pain, dehydration, nausea, vomiting, fever, or weight loss. Some people with crypto may be asymptomatic.

Symptoms usually last about 1 to 2 weeks (with a range of a few days to 4 or more weeks) in persons with healthy immune systems. Occasionally, people may experience a recurrence of symptoms after a brief period of recovery before the illness ends. Symptoms can come and go for up to 30 days. People with weakened immune systems may develop serious, chronic, and sometimes fatal illness.

Because *Cryptosporidium* are so resistant to chlorine, several community-wide outbreaks of cryptosporidiosis have been linked to drinking municipal water or contact with recreational waters contaminated with the parasite. Swimming and other water-related activities are excellent ways to get the physical activity needed for a healthy life, and millions of people enjoy oceans, lakes, rivers, pools, and spas each year. However, it is important to be aware of ways to prevent recreational water illnesses (RWIs).

Section A - Communicable Disease Surveillance

Cryptosporidiosis - Continued

Statewide in 2010, there were 548 cases of cryptosporidiosis reported. This is a 156% increase when compared to the 5-year median (2005-2009). The overall incidence rate was 9.2 per 100,000, for 2010.

Since 2006, the incidence rates in Missouri have seen a steady decline until 2010. In 2010, the incidence rate rose dramatically above the historic level for the past 10 years. Missouri's rate is far higher than the national trend for 2010. Females account for 54.4% of the cases. The 1 to 14 year age group accounts for 44.9% of the cases, with the 25 to 39 year age group closely following at 22.1% of the cases.

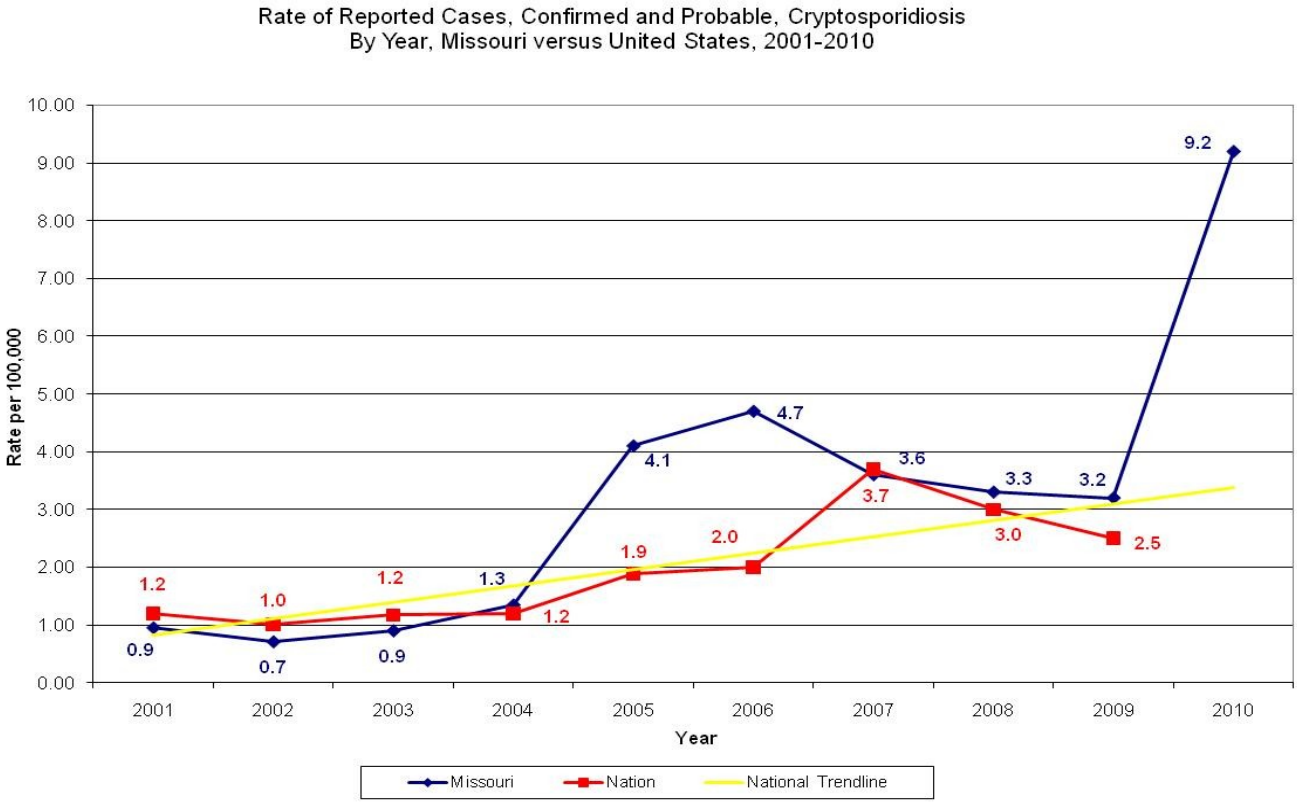
During 2010, an outbreak in the Eastern district contributed approximately 54% of the total cases for that year. The outbreak was attributed to recreational waters.

Comparison to National Data: Nationally, there appears to be a steady upward trend in the number of cases. The annual rate of reported cryptosporidiosis in Missouri has shown a decreasing trend prior to 2010; however, for 2010 Missouri has surpassed its highest historical level for the previous 10 years. Likewise, Missouri has consistently surpassed the national rate since 2004.

Because of the growing concern, CDC has partnered with other agencies to develop a uniform standard that can be used to help prevent RWIs. In the United States, all pool codes are reviewed and approved by state and/or local public health officials. There are no uniform national standards governing design, construction, operation, and maintenance of swimming pools and other recreational water venues. Thus, the code requirements for preventing and responding to recreational water illnesses can vary significantly among local and state agencies. A Model Aquatic Health Code (MAHC) would ensure that the best available standards and practices for protecting public health are available for adoption by state and local agencies. Information on this code can be found at: http://www.cdc.gov/healthywater/swimming/pools/mahc/structure-content/.

Section A - Communicable Disease Surveillance

Cryptosporidiosis - Continued



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Escherichia coli (*E. coli*) and Hemolytic Uremic Syndrome (HUS)

Escherichia coli (*E. coli*) are a diverse group of bacteria. Although the majority of *E. coli* strains are harmless, several are known to cause disease in humans. Many of the disease causing strains of the bacteria produce toxins called Shiga toxins, and are often collectively referred to as Shiga toxin-producing *E. coli* (STEC). The primary source of STEC is the intestinal tract of cattle; however; it has also been isolated from other animals including sheep, goats, deer and others. Humans can also serve as a source of the bacteria with illnesses resulting from person-to-person transmission.

Table 1. Shiga toxin-producing *E. coli* (STEC)
Comparative Statistics, by Socio-demographic Category, Missouri[1] 2010

		Case Count 2010	% of Total	Rate per 100,000	5-Year Median	% Change from 5-Year Median
State of Missouri		236	100.00%	3.9	152	55.30%
Sex	Female	131	55.50%	4.3	77	70.10%
	Male	105	44.50%	3.6	72	45.80%
Race	Black	6	2.50%	0.8	5	20.00%
	Other	6	2.50%	4.2	1	500.00%
	Unknown	28	11.90%	N/A	48	-41.70%
	White	196	83.10%	3.8	105	86.70%
Age Group	00 to <01	7	3.00%	8.9	5	40.00%
	01 to 04	60	25.40%	18.5	39	53.80%
	05 to 14	55	23.30%	7.1	31	77.40%
	15 to 24	36	15.30%	4.3	21	71.40%
	25 to 39	35	14.80%	3	15	133.30%
	40 to 64	23	9.70%	1.2	21	9.50%
	65 plus	18	7.60%	2.2	12	50.00%
	Unknown	2	0.80%	N/A	0	N/A
District	Central	17	7.20%	2.6	17	0.00%
	Eastern	61	25.80%	2.7	50	22.00%
	Northwest	64	27.10%	4	20	220.00%
	Southeast	40	16.90%	8.7	12	233.30%
	Southwest	54	22.90%	5.3	32	68.80%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2009 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System (WebSurv)

The primary STEC strain in the United States is *E. coli* O157:H7, which was first identified as a human pathogen in 1982. Other non-O157 STEC strains have also been identified as important causes of diarrheal illness in the United States including O26, O45, O103, O111, O121, and O145. Most of what we know about STEC comes from investigations of *E. coli* O157:H7 as the non-O157:H7 STEC strains are not as well understood.

The illness caused by STEC includes diarrhea ranging from mild and nonbloody to stools that are virtually all blood. Other symptoms may include severe stomach cramps and vomiting. Symptoms typically begin within 3-4 days following exposure, but can range from 1 to 10 days. Most persons with a STEC associated illness will get better within 5 to 7 days. However, approximately 8% of persons, up to 20% of children, diagnosed with *E. coli* O157 STEC infection will develop a potentially life-threatening complication called hemolytic uremic syndrome (HUS). The condition is often severe as half of persons with diarrhea-associated HUS will require dialysis, and up to 5% who develop HUS will die. Non-O157:H7 STEC strains are less likely to cause severe illness than *E. coli* O157:H7, however, these infections can also result in severe complications including HUS.

Section A - Communicable Disease Surveillance

E. coli (all) and HUS - Continued

Statewide in 2010, a total of 236 cases of STEC associated infections were reported, which was a 55% increase in the number of cases compared to the previous five-year median. The incidence rate for the year was 3.9 cases per 100,000 population and represents the highest rate of reported STEC cases observed over the past decade. Cases were reported from all age groups however, over half of cases occurred in children aged 14 years or younger. Fifty-six percent of reported STEC cases were female. For cases whose race was known, the rate of disease was 4.8 times greater among whites compared to blacks.

A total of 18 cases of HUS were reported among residents of Missouri in 2010, which is an increase of 125% compared to the previous five-year median. Seventy-eight percent of HUS cases were reported among children 14 years of age or younger. Females accounted for 67% of HUS cases. The Southwest district had the highest rate of reported HUS cases (0.9 per 100,000 population) and accounted for half of the 18 cases reported statewide.

Table 2. Hemolytic Uremic Syndrome (HUS)
Comparative Statistics, by Socio-demographic Category, Missouri[1] 2010

		Case Count 2010	% of Total	Rate per 100,000	5-Year Median	% Change from 5-Year Median
State of Missouri		18	100.00%	0.3	8	125.00%
Sex	Female	12	66.70%	0.4	5	140.00%
	Male	6	33.30%	0.2	3	100.00%
Race	Black	0	0.00%	0	1	-100.00%
	Unknown	1	5.60%	N/A	0	N/A
	White	17	94.40%	0.3	7	142.90%
Age Group	00 to <01	1	5.60%	1.3	0	N/A
	01 to 04	9	50.00%	2.8	5	80.00%
	05 to 14	4	22.20%	0.5	2	100.00%
	15 to 24	2	11.10%	0.2	0	N/A
	25 to 39	0	0.00%	0	0	0.00%
	40 to 64	1	5.60%	0.1	0	N/A
	65 plus	1	5.60%	0.1	0	N/A
District	Central	3	16.70%	0.5	1	200.00%
	Eastern	3	16.70%	0.1	1	200.00%
	Northwest	3	16.70%	0.2	2	50.00%
	Southeast	0	0.00%	0	2	-100.00%
	Southwest	9	50.00%	0.9	2	350.00%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2009 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System (WebSurv)

Missouri experienced a significant increase in the number of reported STEC and subsequently HUS cases in 2010. The increase in STEC cases was observed in all but one district of the state, as the Eastern, Northwest, Southeast, and Southwest districts all had observed substantial increases in reported cases. The increase of STEC associated illnesses was particularly high in the Southeast and Northwest districts with increases above the previous five year median of 233% and 220% respectively.

Two outbreaks of *E. coli* O157:H7 were reported in Missouri in 2010. The first occurred among attendees of a local recreational facility located in the Southeast district in April, 2010. A total of 29 cases were identified in association with the outbreak accounting for the overall increase in cases reported in the Southeast district. The second outbreak occurred among attendees of a family gathering in Southwest district in November 2010. A total of 12 persons met the case definition and were identified as outbreak associated cases of *E. coli* O157:H7. The overall findings of the investigations for both outbreaks suggested the illnesses were most likely the result of consumption of contaminated well water.

Section A - Communicable Disease Surveillance

E. coli (all) and HUS - Continued

Comparison to National Data: During the years 2005 to 2009, the rate of STEC cases in Missouri has consistently exceeded the corresponding rate nationally. However, the rates for both have been gradually trending upward despite the slight decrease observed in 2009. Whether these trends represents an actual increase in the incidence of STEC cases or is a reflection of increased testing or changes in diagnostic strategies particularly for non-0157:H7 STEC cases, is unknown. In Missouri, the number of reported non-O157 STEC cases has equaled or exceeded the number of reported cases *E. coli* O157:H7 annually, during the years 2008-2010.

Illnesses caused by STEC are potentially severe and life-threatening and can result from exposures to many different possible sources. It is therefore critically important that cases continue to be promptly reported and potential sources investigated. Identifying the specific source of infection is often difficult particularly in the absence of an outbreak. The collection of accurate exposure information from the ill persons or their surrogates remains an integral component of public health surveillance.

Outbreaks of STEC have been linked to a variety of exposures including ground beef, petting zoos, raw fruits and vegetables, unpasteurized dairy, and both recreational and drinking waters. With the increased risk of severe complications for children, it is critical for parents and guardians to implement preventive measures to reduce the risk of developing a STEC associated illness. Preventative measures for all ages include, but are not limited to: washing hands with soap and water after contact with animals, safe handling and cooking of meats, avoid consuming unpasteurized milk and dairy products, and avoid swallowing or getting recreational water in your mouth.

The safety of drinking water is also important as evidenced by the two outbreaks of STEC investigated in 2010. The primary source of drinking water for many Missourians consists of a private well. Private well owners should consider having their wells tested for the presence of *E. coli* and other coliform bacteria. In addition, the integrity of the well head should be evaluated to avoid potential contamination with surface water that could introduce pathogens such as STEC into the drinking water.

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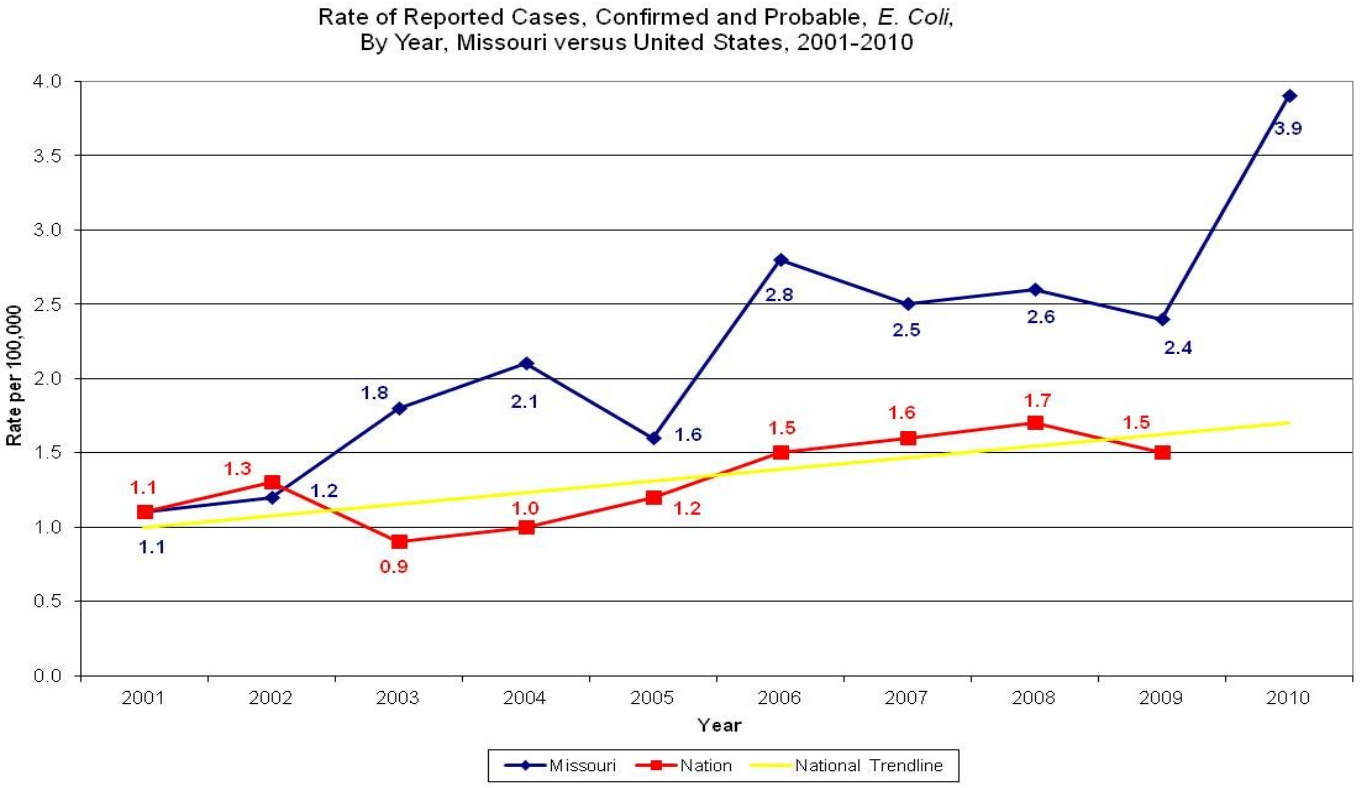
E. coli (all) and HUS - Continued



Additional Website Resources

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Section A - Communicable Disease Surveillance

Haemophilus Influenzae

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Haemophilus Influenzae (*H. influenzae*) includes a group of bacteria, the only known reservoir for the organism is humans. *H. influenzae* are broadly divided into two different groups (encapsulated and unencapsulated) based on their ability to produce an outer layer or capsule. The strains that produce a capsule (encapsulated) can then be further defined by the specific polysaccharides that make up the capsule. A total of six different types have been identified and are designated with the letters A through F. The unencapsulated strains that do not produce a capsule are also referred to as nontypable strains. The presence of the capsule and the capsule type are important indicators of severity of disease, potential risk to others, and determining the appropriate public health response, such as vaccination.

Table 1. Haemophilus Influenzae, Comparative Statistics, by Socio-demographic Category, Missouri[1] 2010

		Case Count 2010	% of Total	Rate per 100,000	5-Year Median	% Change from 5-Year Median
State of Missouri		87	100.00%	1.5	42	107.10%
Sex	Female	48	55.20%	1.6	24	100.00%
	Male	39	44.80%	1.3	18	116.70%
Race	Black	11	12.60%	1.5	7	57.10%
	Unknown	19	21.80%	N/A	15	26.70%
	White	57	65.50%	1.1	26	119.20%
Age Group	00 to <01	7	8.00%	8.9	4	75.00%
	01 to 04	3	3.40%	0.9	2	50.00%
	05 to 14	1	1.10%	0.1	2	-50.00%
	15 to 24	3	3.40%	0.4	1	200.00%
	25 to 39	6	6.90%	0.5	4	50.00%
	40 to 64	21	24.10%	1.1	16	31.30%
	65 plus	46	52.90%	5.6	22	109.10%
District	Central	6	6.90%	0.9	5	20.00%
	Eastern	38	43.70%	1.7	16	137.50%
	Northwest	29	33.30%	1.8	14	107.10%
	Southeast	5	5.70%	1.1	2	150.00%
	Southwest	9	10.30%	0.9	7	28.60%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2009 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System (WebSurv)

Although all *H. influenzae* can cause invasive disease, *H. influenzae* type b (Hib) is of greatest public health concern. Prior to the introduction of effective vaccines, *H. influenzae* type b (Hib) was the leading cause of bacterial meningitis and other invasive infections among children younger than five years of age. In addition to meningitis, infections with Hib include pneumonia, bacteremia, epiglottitis, septic arthritis, cellulitis, otitis media and pericarditis.

Infections are generally seen in infants and children less than five years of age. Invasive disease due to Hib is often severe as approximately 5% of Hib meningitis cases result in death and 25% of persons may experience permanent hearing loss or other long term side effects. With the availability of the Hib vaccine, the incidence of invasive Hib disease in the United States has decreased by 99%. Invasive Hib infections are now relatively uncommon in the United States and occur primarily in unimmunized children or children too young to receive, or have completed, their primary immunization series.

Nontypable *H. influenzae* strains may cause invasive disease but are generally less virulent than encapsulated strains. Nontypable strains are common causes of the respiratory tract including ear infections

Section A - Communicable Disease Surveillance

Haemophilus Influenzae - Continued

in children and bronchitis in adults. Other infections caused by nontypable strains include conjunctivitis, otitis media, sinusitis and pneumonia. *H. influenzae* may also aggravate underlying medical issues such as chronic bronchitis or cystic fibrosis.

H. influenzae are spread from person-to-person via inhalation of respiratory droplets or by direct contact with respiratory tract secretions. Infection may also be spread to neonates by aspiration of amniotic fluid or by contact with infected genital tract excretions. The incubation period is unknown, but likely 2-4 days. Persons remain communicable as long as the organism is present. Persons are no longer considered communicable 24-48 hours after starting appropriate antibiotic treatment.

A total of 87 cases of invasive *H. influenzae* were reported in Missouri in 2010 resulting in an incidence rate of 1.5 cases per 100,000 population. This represents a 107.1% increase of reported cases compared to the previous five year median. Females accounted for 55.2% of cases. Age is a significant risk factor for invasive *H. influenzae* disease. The highest rates were reported among persons less one year of age (8.9 per 100,000) and greater than 64 years of age (5.6 per 100,000). Each of the five districts statewide observed increases in reported cases of invasive *H. influenzae* disease; the greatest increases were observed in the southeast and eastern regions. The cause of the increase in reported cases observed in 2010 is not known. There were four Hib cases reported in 2010.

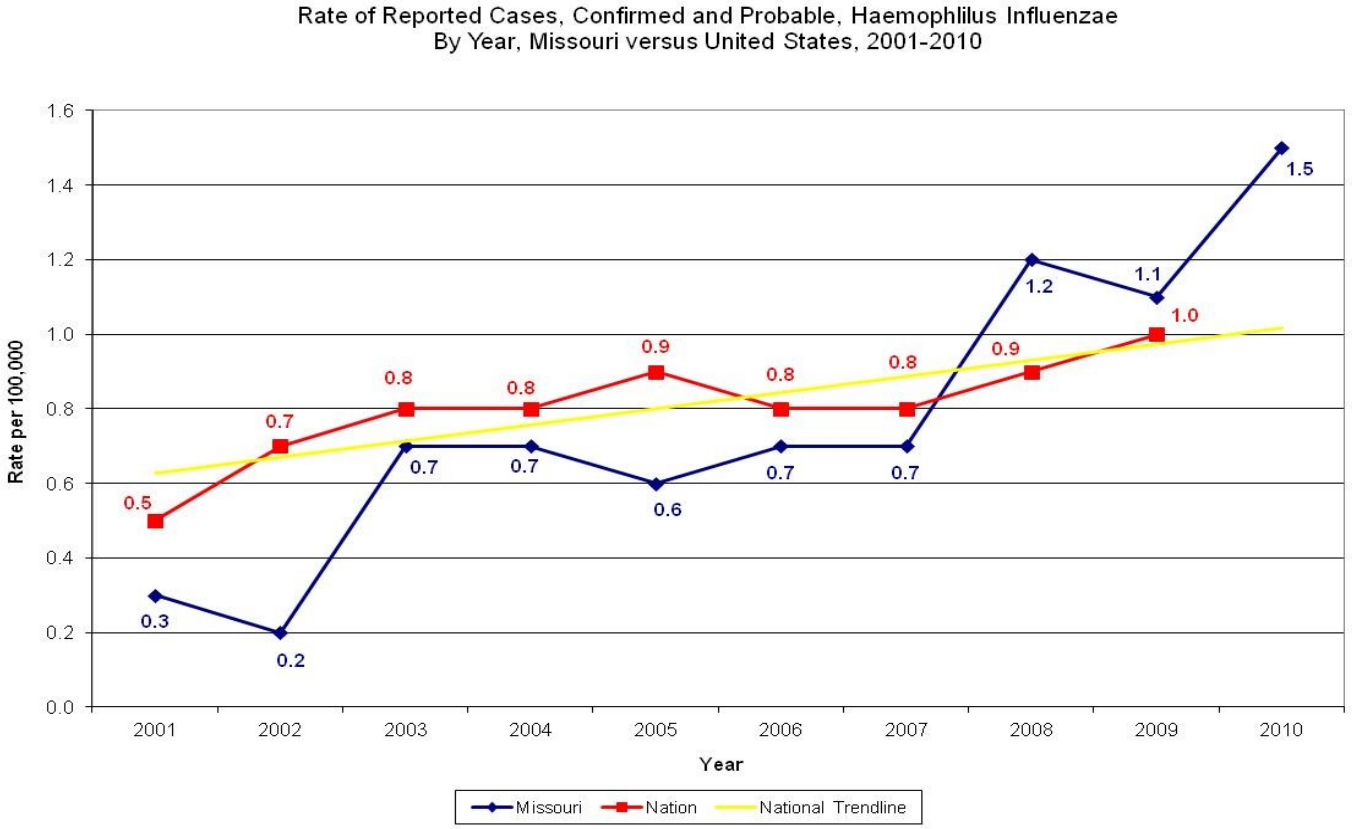
Comparison with National Data: Nationally there appears to be a gradual upward trend in the number of cases of invasive *H. influenza* since 2001. The annual rate of reported cases of *H. influenzae* in Missouri has shown an upward trend since 2001, with a few years showing a decline. However, for 2010 Missouri has surpassed its highest historical level for the past 10 years.

The Hib conjugate vaccine has drastically decreased the incidence of invasive Hib disease in Missouri. Although Hib cases are now uncommon in Missouri, it is important we continue the diligent surveillance of *H. influenzae* invasive disease to promptly identify Hib cases and implement the appropriate public health control measures. In addition, we must continue to monitor the changing epidemiology of Hib invasive disease. Serotype information for all *H. influenza*e invasive disease cases is essential and will generate data needed to examine strategies for elimination of this disease.

It is critically important to continue to promote the vaccination of children for the prevention of Hib, which is the most proven measure of prevention against Hib. Other prevention measures are also important at reducing the risk of *H. influenzae* associated diseases including the education and implementation of good hand washing and appropriate cough/sneeze etiquette.

Section A - Communicable Disease Surveillance

Haemophilus Influenzae - Continued



Additional Website Resources

CDC Health Topics

CDIRM

Health Districts Defined

Section A - Communicable Disease Surveillance

Rabies, Animal and Human
Rabies Post-Exposure Prophylaxis (PEP) Initiated

All Species Map
Wild Species Map
Domesticated Species Map
PEP Map

Rabies is a fatal viral illness that affects only mammals. Although there is great variability in the susceptibility of various species to infection with this virus and subsequent manifestation of disease, any mammal may be infected with the rabies virus and serve as a source of infection for other mammals. Virus is typically present in the saliva of clinically ill mammals and is most often transmitted through a bite. After entering the central nervous system of the next host, the virus causes an acute, invariably progressive encephalomyelitis that is almost always fatal. The incubation period in animals and humans is usually several weeks to months, but may range from days to years. Rabies has the highest case fatality ratio of any infectious disease if prompt intervention is not initiated in the case of humans; there is no postexposure intervention for animals. Laboratory testing for rabies is useful for confirmation of the virus' presence in certain species and geographic locations, and for determination of the need to administer rabies prophylaxis in cases of human exposure to a potentially rabid animal. The only reliable method of testing animals for the presence of rabies virus is through laboratory analysis of brain tissue. Public health surveillance for this disease in domestic and wild animal populations is a valuable tool in the prevention of human rabies cases.

Table 1. Animal Rabies, by Species, Missouri 2010

Species	Number Examined	Number Positive	Percent Positive
Bat	1,125	40	3.60%
Cat	523	1	0.20%
Cow	14	0	0.00%
Dog	644	0	0.00%
Exotic	2	0	0.00%
Ferret	2	0	0.00%
Fox	12	0	0.00%
Horse	17	0	0.00%
Other Domestic	4	0	0.00%
Other Wild	47	0	0.00%
Raccoon	91	0	0.00%
Rodent/Rabbit	63	0	0.00%
Skunk	46	22	47.80%
Total	2,590	63	2.40%

Rabies (Animal)

During 2010, 63 cases of animal rabies were detected in Missouri, compared to 65 cases the previous year, representing a 3.08% decrease. Animals found to be rabid in Missouri during 2010 included 40 bats, 22 skunks, and 1 cat. The number of specimens tested in 2010 was 2,590, with 63 found positive, giving a positivity rate of 2.4%. In 2009, 65 of 3,388 submitted specimens tested positive, yielding a 1.9% positivity rate. The annual number of rabies cases during the preceding ten years (2000-2009) ranged from a low of 38 cases in 2007 to a high of 73 cases in 2005. The median number of cases per year during this time period was 54.5.

The number of rabid animals detected each year varies according to several parameters, including awareness on the part of the public and health community regarding this disease, the willingness and ability of agencies and individuals to submit specimens for testing, competing interests, financial constraints and, of course, the actual incidence of rabies in wildlife. As with most diseases having wild animals as the

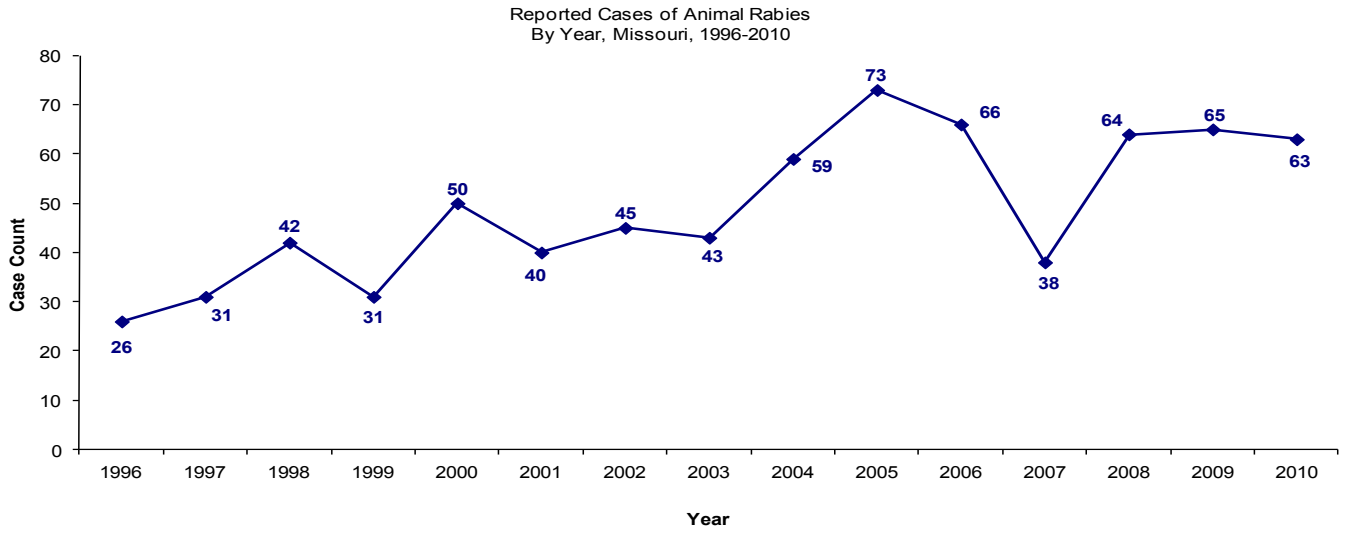
Section A - Communicable Disease Surveillance

Rabies, Animal and Human; Rabies Post-Exposure Prophylaxis (PEP) Initiated - Continued

reservoir, the number of rabies cases goes through a cycle of "troughs" and "peaks" over a period of several years. Peaks usually correspond to the infection of large numbers of immunologically naïve animals that result when populations increase due to favorable environmental conditions, decreased human intervention (hunting, trapping, eradicating), and other factors. Troughs result as transmission rates decrease among rabies die-off survivors, which tend to have a wider degree of geographic dispersion and perhaps some level of immunity. Survivors eventually reproduce, providing a new population of vulnerable animals through which the rabies virus can spread and which results in the next peak of the cycle. As the number of rabid reservoir animals (which are bats and skunks, in Missouri) increases, so does the chance of "spill-over" into other species, both wild and domestic. Presumably, the percentage of animals that test positive for rabies increases as the natural incidence increases (and vice versa), but there is little predictive value to this relationship since the exact correlation cannot be determined with existing data.

The SPHL is the only facility in Missouri that tests animals for rabies. Specimens are tested only when there is known exposure or "significant potential exposure" of any of the following to a possibly infected animal: humans, pets, domesticated animals (e.g., horses, livestock), exotic or non-native animal species maintained for husbandry purposes or in zoos. For more details regarding criteria for submission of rabies specimens (including the definition of "significant potential exposure"), refer to the rabies testing policy letter at http://health.mo.gov/lab/pdf/rabies_testing_policy.pdf.

In 2010, specimens were submitted from all regions of the state, with rabid animals detected in 20 counties. The first rabid animal detected was a skunk in Howell County on January 19th, while the last animal was detected on November 19th, a skunk in Dent County. The months with the highest number of cases were June (12), with six counties detecting a total of 2 skunks and 10 bats; and in July (13) with nine counties detecting a total of 1 cat, 2 skunks and 10 bats.



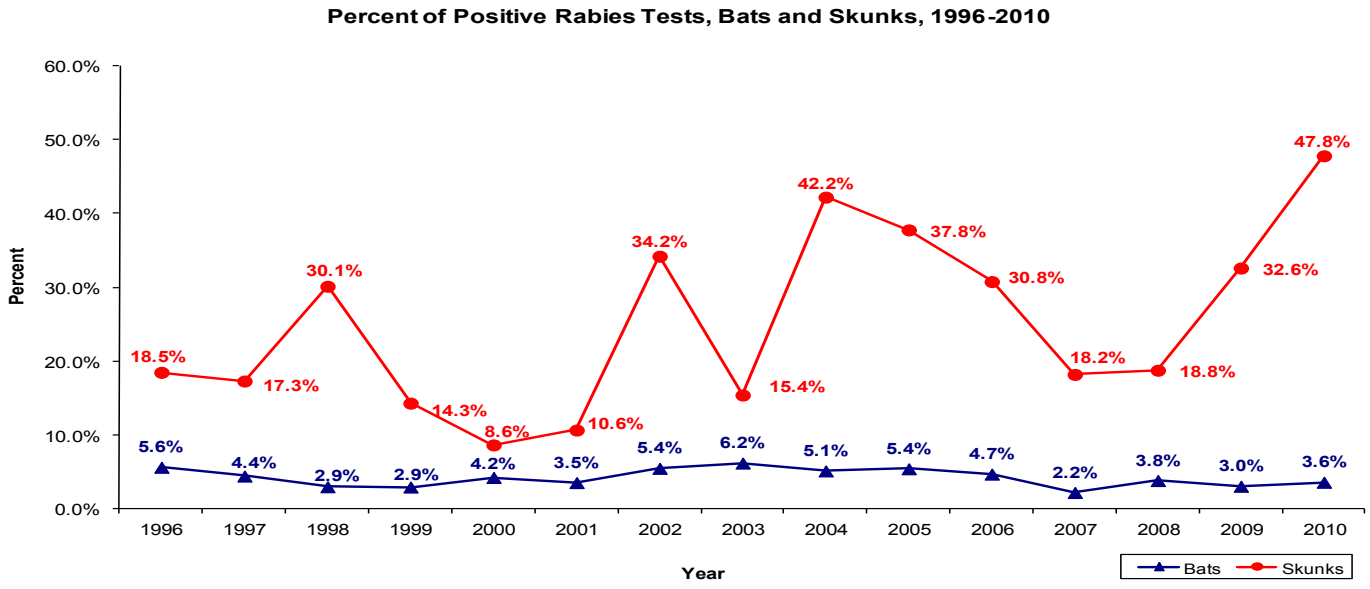
Section A - Communicable Disease Surveillance

Rabies, Animal and Human; Rabies Post-Exposure Prophylaxis (PEP) Initiated - Continued

Rabies in bats occurs sporadically throughout Missouri. It is estimated that less than 0.5 percent of the bats in the wild are rabid, and only 3.6 percent of the "high risk" bats (e.g., found sick, dead, or exhibiting unusual behavior) tested positive during 2010. The big brown bat (*Eptesicus fuscus*), eastern red bat (*Lasiurus borealis*), and the tri-colored bat (*Perimyotis subflavus*) account for about 95 percent of the species of bats found to be rabid in Missouri. Note: The tri-colored bat was formerly known as the eastern pipistrelle bat. While rabid skunks can be found anywhere in the state, most cases are usually confined to roughly the southern one-half of Missouri. Both the north-central and south-central variants of the skunk rabies virus are found in rabid skunks in Missouri. The percent of skunks that test positive for rabies is much more variable than the percent of bats testing positive, with evidence of rabies infection found in 47.8 percent of the skunks submitted in 2010. A county is placed under a "rabies alert" when a positive domestic animal is detected in that county or when the threshold level for rabid wild animals is exceeded. Two counties were placed under alert in 2010: Howell County (April) due to an unusually high number of rabid skunks; Wright County (July) due to a rabid cat. Alerts routinely last for three months, but can be extended if additional rabid wild/domestic animals are detected during that time.

Rabies (Human)

No human rabies deaths were recorded in Missouri in 2010. The last known human death from rabies in this state (2008) involved a man who was bitten by a bat and, although aware of the bite, did not seek medical care or report the incident to public health officials until he was symptomatic. A complete description of this case can be found in the *Morbidity and Mortality Weekly Report*, Centers for Disease Control and Prevention, Vol. 58/No. 43/November 6, 2009 (http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5843a3.htm).



Section A - Communicable Disease Surveillance

Rabies, Animal and Human; Rabies Post-Exposure Prophylaxis (PEP) Initiated - Continued

Rabies Postexposure Prophylaxis (Initiated)

"Rabies postexposure prophylaxis (initiated)" (RPEP), became a reportable condition on August 31, 2006. This condition was reported only thirteen times during the remainder of that year, while 159, 259, 232 and 294 reports were received in 2007, 2008, 2009, and 2010 respectively. CDC estimates that about 40,000 persons receive RPEP in the United States each year. Missourians no doubt account for a significant portion of these cases due to the endemnicity of rabies in wild animals in the state and the interaction of people and their pets with these animals. The expense of providing RPEP remains high and variable, with an estimated average cost of more than $5,000 per patient.

Administration of RPEP is a medical urgency, not a medical emergency. Physicians should evaluate each possible exposure to rabies and, if necessary, consult with local or state public health officials regarding the need for rabies prophylaxis. Factors that should be considered before specific antirabies postexposure prophylaxis is initiated include type of exposure (bite, nonbite), epidemiology of rabies in animal species involved, circumstances of bite incident, vaccination status of exposing animal, and availability of animal for quarantine or testing.

If exposed to rabies, previously vaccinated persons should receive two intramuscular doses (1.0 ml each) of vaccine, one immediately and one three days later. Previously vaccinated persons are those who have received one of the recommended preexposure or postexposure regimens of cell tissue culture vaccine, or those who received another vaccine and had a documented rabies antibody titer. Human rabies immunoglobulin (RIG) is unnecessary and should not be administered to these persons because the administration of passive antibody might inhibit the relative strength or rapidity of an expected anamnestic response.

Persons who have not been previously vaccinated should receive both vaccine and RIG. The combination of RIG and vaccine is recommended for both bite and nonbite exposures, regardless of the interval between exposure and initiation of treatment. A regimen of four 1-ml doses of vaccine should be administered intramuscularly. The first dose of the four-dose course should be administered as soon as possible after exposure (day 0). Additional doses should be administered on days 3, 7, and 14 after the first vaccination. Immunosuppressed individuals should receive a fifth dose of vaccine on day 28, with the awareness that the immune response may still be inadequate. A patient who fails to develop an antibody response should be managed in consultation with their physician and appropriate public health officials. As noted above, in addition to bite exposures, RIG is indicated for non-bite exposures, such as saliva from an infectious animal that is splashed into a person's eyes, nose, or mouth or which comes in contact with a fresh open cut, abrasion, or other wound. RIG is also indicated in those situations where a bite from an infected animal may not be apparent but is presumed to have occurred (such as a possible bite from a rabid bat) and for which RPEP is being administered. RIG is administered only once (i.e., at the beginning of RPEP) to previously unvaccinated persons to provide immediate, passive, rabies virus neutralizing antibody coverage

Section A - Communicable Disease Surveillance

Rabies, Animal and Human; Rabies Post-Exposure Prophylaxis (PEP) Initiated - Continued

until the patient responds to rabies vaccination by actively producing antibodies. If RIG was not administered when vaccination was begun (i.e., day 0), it can be administered up to and including day seven of the RPEP series. Beyond the seventh day, RIG is not indicated because an antibody response to rabies vaccine is presumed to have occurred. Because RIG can partially suppress active production of antibody, the dose administered should not exceed the recommended dose. The recommended dose of RIG is 20 IU/kg (0.133 mL/kg) body weight. This formula is applicable to all age groups, including children. If anatomically feasible, the full dose of RIG should be thoroughly infiltrated in the area around and into the wounds. Any remaining volume should be injected IM at a site distant from vaccine administration. This recommendation for RIG administration is based on reports of rare failures of RPEP when less than the full amount of RIG was infiltrated at the exposure site. RIG should never be administered in the same syringe or in the same anatomical site as the first vaccine dose. However, subsequent doses of vaccine in the 4-dose series can be administered in the same anatomic location where the RIG dose was administered, if this is the preferable site for vaccine administration (i.e., deltoid for adults or anterolateral thigh for infants and small children).

The following measures should be employed to help prevent rabies in the community:

- Ensure dogs, cats, and ferrets are vaccinated against rabies; vaccinations are also available for horses, cattle, and sheep.
- Keep pets under control; do not allow them to run loose.
- Avoid contact with stray pets and wild animals.
- Report stray pets to an animal control officer as well as wild animals that are acting strangely.
- If bitten by an animal, wash the wound with soap and water for 10 to 15 minutes and consult a physician to determine if RPEP, tetanus booster, and antibiotics are needed.
- Have pets spayed or neutered, since pets that are fixed are less likely to stray from home and produce unwanted litters.
- Pets should not be handled without gloves or other protection directly after they have been exposed to wildlife since they might have saliva on their fur from a rabies-infected animal.

Additional Website Resources

CDC Health Topics

CDIRM

Health District Defined

Section A - Communicable Disease Surveillance

Streptococcus pneumoniae, drug resistant invasive disease and invasive in children less than five (5) years

Drug-resistant
< 5 years

Streptococcus pneumoniae (*S. pneumoniae*) also called pnuemococcus, are bacteria that are often found in the nose and throat of humans. Studies suggest *S. pneumoniae* can be found in 5% - 70% of healthy adults and up to 59% of healthy children. There are more than 90 serotypes that have been identified based on differences in the polysaccharide capsule produced by the pathogen. The distribution of the serotypes varies regionally and by the age of the infected persons.

Streptococcus pneumoniae are spread from person to person through respiratory droplets or direct contact with respiratory secretions. The majority of infected persons will not develop an illness though will be colonized with the bacteria and therefore are able to continue the spread of this opportunistic pathogen. Rates of infection are typically higher among infants, young children, and the elderly. Persons with immunocompromising or certain chronic conditions are also at a greater risk for *S. pneumoniae* associated disease. These conditions can include pneumonia, bacteremia, meningitis, peritonitis, and arthritis. In addition, *S. pneumoniae* is a common cause of ear infections particularly among children. The incubation period is not known though thought to be one to four days. Pneumococcal infections are most common in winter months and viral upper respiratory tract infections, including influenza, can predispose persons to *S. pneumoniae* associated disease.

Antibiotics are typically used to treat *S. pneumoniae* infections. Treatment decisions have become more complicated as the bacteria have developed resistance to certain antibiotics previously used for treatment. Until the mid-1970's, most relevant antibiotics readily treated *S. pneumoniae* infections. In some areas of the United States, up to 40% of invasive *S. pneumoniae* isolates are resistant to penicillin. Because resistance is common, susceptibility testing of *S. pneumoniae* isolates is often used to determine the appropriate antibiotic therapy.

Pneumococcal vaccines play an important role in preventing invasive *S. pneumoniae* infections. Currently, there are two pneumococcoccal vaccines available in the United States. The 23-valent polysaccharide vaccine (PPSV23) is recommended for all adults 65 years of age and older, and for persons two years of age and older with certain preexisting medical conditions. The pneumococcal conjugate vaccine (PCV13) is recommended for all children younger than 24 months of age and children 24-59 months of age with a high risk medical condition. Since the introduction of the pneumococcal conjugate vaccines in 2000 through 2006, the incidence of vaccine-type invasive pneumococcal infections decreased by 99% and the incidence of invasive *S. pneumoniae* decreased by 77% in children younger than 5 years of age in the United States.

Section A - Communicable Disease Surveillance

Strep Pneumoniae - Continued

Surveillance for *S. pneumoniae* associated diseases can vary among states nationally. The infections are determined to be invasive when the bacteria are identified in a normally sterile site including blood, cerebrospinal fluid, or less commonly joint, pleural, or pericardial fluid. In Missouri, two categories of invasive *S. pneumoniae* infections are reportable: 1) invasive diseases in children less than five years of age; and 2) invasive disease in all ages where the *S. pneumoniae* is determined to be resistant to at least one antimicrobial agent approved for use in treating the infection. A summary of *S. pneumoniae* invasive disease based on each of the two reporting categories is provided below.

Streptococcus pneumoniae Invasive Disease in Children Less than Five Years of Age

In 2010, a total of 40 cases of invasive *S. pneumoniae* infections were reported among children less than five years of age in Missouri. The resulting state rate was 0.7 cases per 100,000 population and represents a 37.9% increase from the previous five year median. Approximately 60% of cases occurred among white children, however, the race specific incidence rate was 4.0 times greater among black children compared to white children. All of the reported cases (40 cases) consisted of children aged 1 – 4 years of age though the age specific incidence rates were higher among infants. Invasive S. pneumonia infections in children less than five years of age were reported from the eastern, northwestern and southwestern regions of the state whereas the central and southwestern regions reported no cases. Increases in reported cases were observed in the eastern and northwestern regions while decreases were observed in other regions.

Table 1. Strept Pneumoniae, Invasive in children less than five (5) years of age, Comparative Statistics, by Socio-demographic Category, Missouri[1] 2010

		Case Count 2010	% of Total	Rate per 100,000	5-Year Median	% Change From 5-Year Median
State of Missouri		40	100.00%	0.7	29	37.90%
Sex	Female	21	52.50%	0.7	9	133.30%
	Male	18	45.00%	0.6	20	-10.00%
	Unknown	1	2.50%	N/A	0	N/A
Race	Black	15	37.50%	2.1	6	150.00%
	Other	1	2.50%	0.7	1	0.00%
	White	24	60.00%	0.5	15	60.00%
Age Group	00 to <01	10	25.00%	12.7	8	25.00%
	01 to 04	30	75.00%	9.2	19	57.90%
	05 to 14	0	0.00%	0	0	0.00%
	15 to 24	0	0.00%	0	0	0.00%
	25 to 39	0	0.00%	0	0	0.00%
	40 to 64	0	0.00%	0	0	0.00%
	65 plus	0	0.00%	0	0	0.00%
District	Central	0	0.00%	0	4	-100.00%
	Eastern	20	50.00%	0.9	10	100.00%
	Northwest	17	42.50%	1.1	9	88.90%
	Southeast	3	7.50%	0.7	4	-25.00%
	Southwest	0	0.00%	0	1	-100.00%

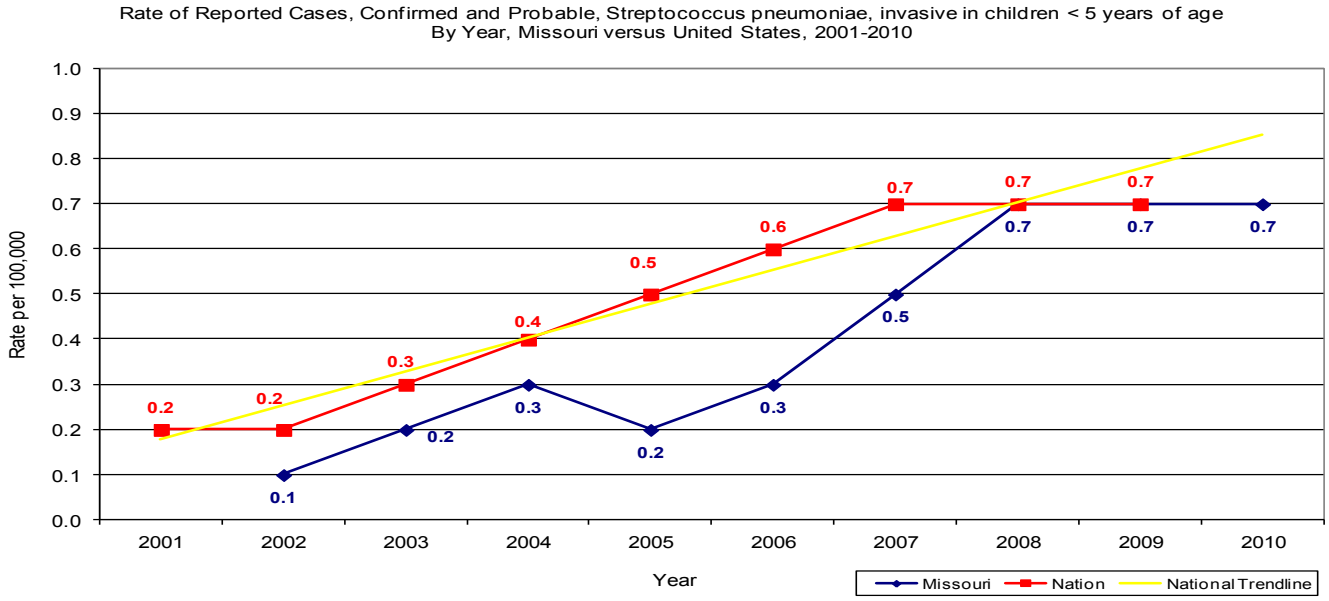
[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2009 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System (WebSurv)

Comparison to National Data: From 2002 through 2010 the observed incidence of reported *S. pneumoniae* invasive diseases cases reported among children less than five in Missouri and nationally gradually increased. However, during the past three years the rate (0.7/100,000 pop.) has remained consistent with both the national and Missouri rates being identical. No outbreaks of invasive *S. pneumoniae* were reported among Missouri children less than five years of age in 2010.

Section A - Communicable Disease Surveillance

Strep Pneumoniae - Continued

Streptococcus pneumoniae remains one of the two most common causes of bacterial meningitis in infants and young children in the United States. The introduction of the PCV7 vaccine has greatly reduced the incidence of *S. pneumoniae* infections; however, invasive disease caused by serotypes of the bacteria not included in the vaccine has increased nationally. In addition, treatment of invasive disease can be challenging given the propensity of the organism to develop resistance to antibiotics traditionally prescribed for treatment. *Streptococcus pneumoniae* is easily spread particularly among children. Continued surveillance for this opportunistic pathogen is important as we continue to evaluate the effectiveness of the pneumococcal vaccines and monitor for changing trends of invasive disease among those most vulnerable, which includes the very young.



Streptococcus pneumonia, Drug Resistant Invasive Disease

In 2010, a total of 91 cases of invasive *S. pneumoniae* infections reported among Missouri residents were caused by isolates resistant to an antibiotic approved for use in treatment and determined to be drug resistant. The resulting state rate was 1.5 cases per 100,000 population, which is an increase from the state rate of 1.3 cases per 100,000 population in 2009. Fifty-six percent of cases were among females. Race specific rates were higher among blacks than whites, 2.4 and 1.2 per 100,000 population respectively. Missouri residents 65 years of age and older, are at greatest risk for drug resistant *S. pneumoniae* invasive disease, with age specific rates approximately two times greater than the next highest age group. Reported cases increased in each district of the state with the exception of the Central district. The highest rates (6.7 cases per 100,000 population) were reported among residence of the Southeast district, which is 4.4 times greater than the overall state rate. The reason for the increase in Southeast Missouri is unknown.

Section A - Communicable Disease Surveillance

Strep Pneumoniae - Continued

Comparison to National Data: The overall rates of drug resistant invasive *S. pneumoniae* infections nationally have remained relatively static during the previous ten years. Prior to 2008, the rates in Missouri were typically below the rates nationally. During the last three years the rates in Missouri have been slightly above the national rates. The fluctuation in rates of the disease in Missouri is not fully understood. No outbreaks of invasive drug resistant invasive *S. pneumoniae* infections were reported among Missouri residents in 2010.

Table 1. Strep Pneumoniae, Drug-Resistant
Comparative Statistics, by Socio-demographic Category, Missouri[1] 2010

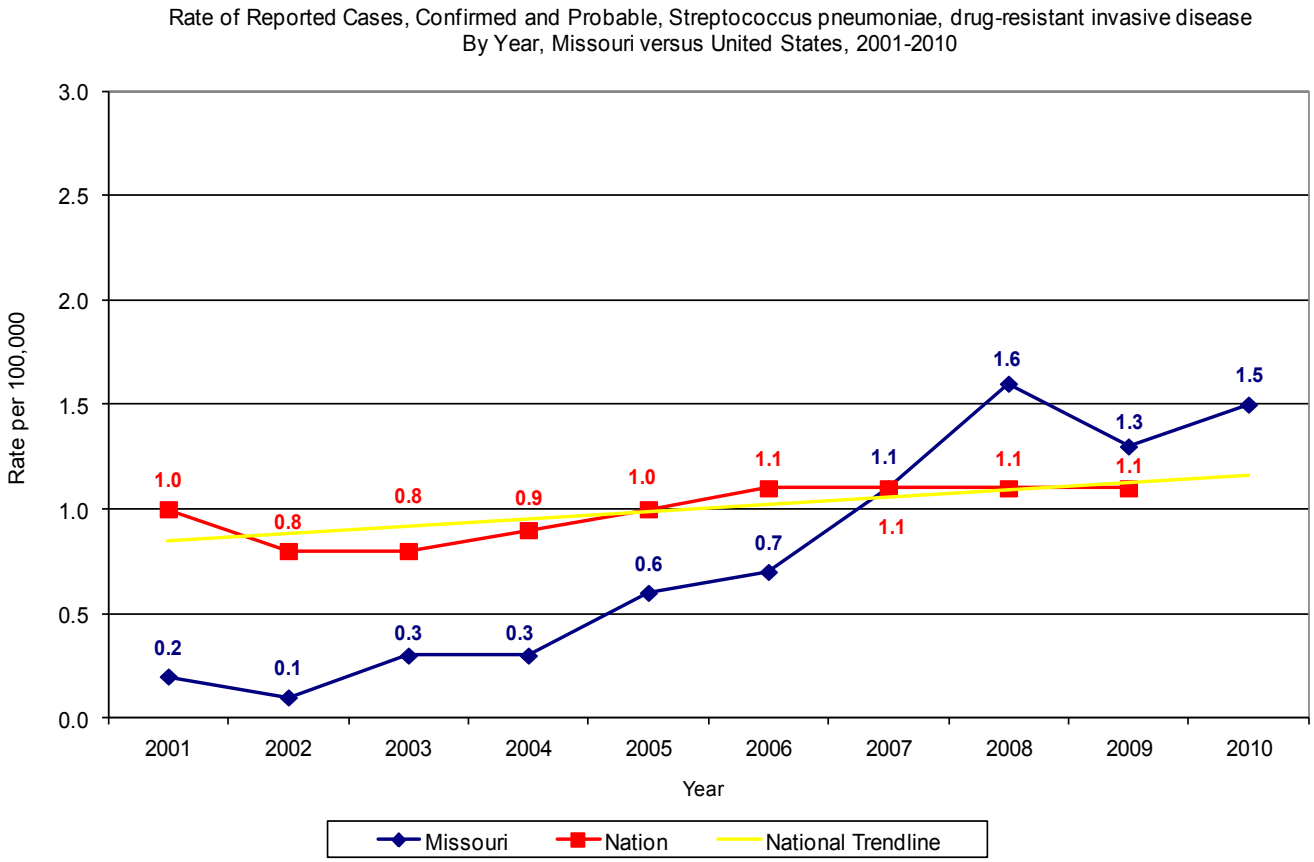
		Case Count 2010	% of Total	Rate per 100,000	5-Year Median	% Change From 5-Year Median
State of Missouri		91	10.00%	1.5	65	40.00%
Sex	Female	51	56.00%	1.7	28	82.10%
	Male	40	44.00%	1.4	29	37.90%
Race	Black	17	18.70%	2.4	11	54.50%
	Other	2	2.20%	1.4	0	N/A
	Unknown	11	12.10%	N/A	10	10.00%
	White	61	67.00%	1.2	43	41.90%
Age Group	00 to <01	0	0.00%	0	1	-100.00%
	01 to 04	0	0.00%	0	2	-100.00%
	05 to 14	7	7.70%	0.9	2	250.00%
	15 to 24	0	0.00%	0	0	0.00%
	25 to 39	4	4.40%	0.3	4	0.00%
	40 to 64	42	46.20%	2.1	25	68.00%
	65 plus	38	41.80%	4.6	25	52.00%
District	Central	5	5.50%	0.8	8	-37.50%
	Eastern	31	34.10%	1.4	20	55.00%
	Northwest	17	18.70%	1.1	10	70.00%
	Southeast	31	34.10%	6.7	16	93.80%
	Southwest	7	7.70%	0.7	5	40.00%

[1]Socio-demographics are missing for some cases.
*All rates are calculated per 100,000 using 2009 population estimates provided by MDHSS, Bureau of Health Informatics.
Data Source: Missouri Health Surveillance Information System (WebSurv)

The development of drug resistant pathogens is an important issue as many of the antibiotics previously used to treat these infections are no longer effective. *Streptococcus pneumoniae* can become resistant to antibiotics by acquiring genetic material from other bacteria with which they coexist in close proximity. This highlights the importance of appropriate use of antibiotics. Despite the availability of pneumococcal vaccines for disease prevention and antibiotics used to treat disease approximately 14% of hospitalized adults with invasive disease caused by *S. pneumoniae* will die due to the illness. The surveillance of drug resistance invasive *S. pneumoniae* infections is critical in the continued efforts to monitor for increased drug resistance and evaluate the effectiveness of the pneumococcal vaccines.

Section A - Communicable Disease Surveillance

Strep Pneumoniae - Continued



Additional Website Resources

CDC Health Topics

CDIRM - DR
CDIRM - <5

Health Districts Defined

Glossary

Agent (of Disease) - A factor (e.g. virus, bacterium , parasite, chemical, or radiation) whose presence, excessive presence, or absence of, is essential for the occurrence of disease.

Bioterrorism - The intentional use of chemical, biological, or radiological agents as weapons during acts of violence or intimidation.

Case - A person or animal identified as having a particular disease.

Confirmed Case - surveillance definition, a case usually with positive laboratory results for the disease, generally associated with signs and symptoms of the disease.

Probable Case - surveillance definition, a case usually with a clinically compatible illness that is epidemiologically linked to a confirmed case.

CD - Communicable Disease (or Infectious Disease) - diseases caused by biological agents such as a virus, bacterium or parasite.

Communicable - Able to spread disease from one person or species to another, either directly or indirectly; contagious.

Disseminated intravascular coagulopathy - bleeding into the skin.

ELC - Epi Laboratory Capacity Grant.

Encephalomyelitis - Encephalitis that is accompanied by infection and inflammation of the spinal cord.

Endemnicity - Amount or severity of a disease in a particular geographic area.

Epidemiology - The study of how and why diseases and other conditions are distributed within the population the way they are.

Epidemiologist - An investigator who studies the occurrence of disease or other health-related conditions or events in defined populations.

Fecal-oral - The transmission of an infectious agent by ingestion of feces.

Five-year Median - A data set which includes five consecutive year data totals where half of the elements have a larger value and half of the elements have a lesser value. The median can be thought of as the "middle" of the data.

Glossary

Incidence - The number of new cases of a disease occurring in a population during a defined time period.

Incidence Rate - The rate at which new events occur in a population. For examples of the calculations, see page 41.

Incubation period - The time between exposure to an infectious agent and appearance of the first sign or symptom of the disease.

Leukopenia - Abnormal decrease of white blood cells usually below 5000/mm^3.

Malaise - A subjective sense of discomfort, weakness, fatigue, or feeling rundown that may occur alone or accompany other symptoms and illnesses.

Mean - Commonly called average, is defined as the sum of the observations divided by the number of observations. For examples of the calculations, see page 41.

Median - The point in a data set where half of the elements have a larger value and half of the elements have a lesser value. The median can be thought of as the "middle" of the data. For examples of the calculations, see page 41.

Morbidity - Having disease, or the proportion of persons in a community with the disease.

Mortality - Refers to death.

Myalgia - Tenderness or pain in the muscles; muscular rheumatism.

Neonate - a newborn infant up to one month of age.

Outbreak - The occurrence of illness(es) similar in nature and clearly in excess of normal expectancy.

Pandemic - An outbreak occurring over a wide geographic area; widespread.

Pathogen - An organism capable of causing disease.

Pathogenic - Capable of causing disease.

PCR - Polymerase Chain Reaction. A laboratory procedure used to identify pathogens through amplification of genetic material.

Peritonitis - Inflammation of the serous membrane that lines the abdominal cavity and its viscera.

PFGE - Pulse Field Gel Electrophoresis. A laboratory procedure of bacterial strain typing.

Polysaccharide capsule- A protective covering made out of sugar molecules that surrounds some bacteria.

Glossary

Prevalence - The total number of cases of a disease existing in a given area at any given time.

Preventable TB case:
- A person with a previous positive TB skin test who is a candidate for treatment and not offered treatment;
- A person with a risk factor for TB who is never offered a TB skin test; and/or
- A secondary case to a preventable case.

Quartile - Any of three values which divide the sorted data set into four equal parts, so that each part represents 1/4 of the sample or population.

Recreational Water - Swimming pools, hot tubs, water parks, water play areas, interactive fountains, lakes, rivers, creeks or oceans.

Risk Factors - The presence of any particular factor known to be associated with health related conditions considered important to prevent.

Sequela: A condition following and resulting from a disease.

Serotype - To distinguish organisms on the basis of their constituent antigen(s).

Surveillance (of disease) - An ongoing mechanism to collect, analyze, interpret and distribute information.

Trend - Shows movement consistently in the same direction over a long time.

Thrombocytopenia - An abnormal decrease in the number of platelets.

Vaccine - A suspension of attenuated live or killed microorganisms or fractions thereof, administered to induce immunity and thereby prevent infectious disease.

Vector - A carrier, usually an insect or other arthropod.

Statistical Calculations

Examples of Calculations

Mean

Calculate the **mean** by adding all of the values and dividing the sum by the number of observed values (in this case 11).

55 + 12 + 60 + 46 + 85 + 27 + 39 + 94 + 73 + 5 + 60 = **556**

556 / 11 = **50.54545455**

The **mean** for this data set is **50.5** (result is rounded).

Median

The **median** is the element that falls in the middle of the ordered set. Rank the values from least to most:

39, 60, 73, 85, 55, 27, 12, 94, 60, 46, 5

In this example the **median** is the sixth element in the set, which is **55**.

5, 12, 27, 39, 46, **55**, 60, 60, 73, 85, 94

Incidence rates are calculated with the following equation:

(X divided by Y) multiplied by K

Where:
X is the number of cases for a specified time period
Y is the population (possibly exposed) for the same time period
K is a constant (often 1000 or 100,000) that transforms the result into a uniform quantity allowing comparison with other similar quantities.

Example: The Southwest Region has 86 cases of Hepatitis A in 1993, compared to 63 cases in the Central Region for that year. The 1993 population for the Southwest Region is 694,712, while the population for the Central Region is 621,740.

Southwest Region: **(86 / 694,712) * 100,000 = 12.4**
Central Region: **(63 / 621,740) * 100,000 = 10.1**

A comparison of the two incidence rates shows that in 1993 Southwest Region has a slightly higher incidence of Hepatitis A (12.4 reported cases per 100,000 population) than the Central Region (10.1 reported cases per 100,000 population).